THE FEDERATION OF INSURANCE INSTITUTES
OF GREAT BRITAIN AND IRELAND.

JOURNAL

1906.

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NAME.	TOWN.	Date of Election.	Branch.
A. Blair,	Glasgow,	1898.	Fire.
W. Blair,	Bristol,	1905.	Fire.
J. H. Boocock,	Birmingham,	1898.	Fire.
J. G. Boss,	Newcastle-on-Tyne,	1899.	Fire.
C. D. Butler,	Birmingham,	1899.	Fire.
S. Butler,	Newcastle-on-Tyne,	1899.	Fire.
J. H. Chapman,	Newcastle-on-Tyne,	1904.	Fire.
A. H. Cowpe,	Leeds,	1905.	Fire.
H. D. Curnick,	Manchester,	1903.	Fire.
J. P. Eddison,	Leeds,	1899.	Fire.
W. R. Evison,	London,	1906.	Fire.
A. S. Fraser,	Dundee,	1903.	Fire.
J. Gemmill,	Glasgow,	1902.	Fire.
F. S. Goggs,	Edinburgh,	1904.	Accident.
N. B. Gunn,	Edinburgh,	1899.	Life.
A. Guthrie,	Glasgow,	1905.	Fire.
J. M. Guttridge,	Manchester,	1901.	Fire.
W. Hartley,	Manchester,	1904.	Fire.
J. Haslam,	Nottingham,	1899.	Accident.
H. M. Healy,	London,	1906.	Fire.
W. Holbrook,	Leeds,	1903.	Fire.
C. E. Howell,	Dublin,	1898.	Life.
F. Izant,	London,	1906.	Fire.
M. P. Jones,	London,	1906.	Fire.
O. D. Jones,	Leeds,	1901.	Fire.
W. S. Kinnear,	Dublin,	1902.	Fire.
D. L. Laidlaw,	Glasgow,	1901.	Fire.
G. L. Lambert,	Manchester,	1903.	Fire.
R. McConnell,	Manchester,	1901.	Fire.
W. G. Neish,	Newcastle-on-Tyne,	1904.	Fire.
P. L. Newman,	York,	1899.	Life.
C. E. Noverre,	London,	1905.	Fire.
J. Ostler,	Manchester,	1898.	Fire.
H. J. Pearce,	Glasgow,	1904.	Life.
H. Pocklington,	Leeds,	1902.	Fire.
W. Richardson,	Edinburgh,	1903.	Fire.
J. B. Roberts,	Leeds,	1898.	Fire.
J. Robertson,	London,	1904.	Fire.
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R. Taylor,	Leeds,	1906.	Fire.
A. G. Thomson,	Edinburgh,	1904	Accident.
A. D. L. Turnbull,	Edinburgh,	1905.	Life.

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Dr. FOR TWELVE MONTHS ENDING DECEMBER 31st, 1905. Cr.

Dr.

To Balance from last Account		£212 14 1
,, Journal Sales—		
Institutes	£170 7 1	
C. & E. Layton	25 18 7	
Sundry Sales	20 14 2	
		216 19 10
,, Examinations—		
Entrance Fees		57 5 6
,, Contributions—		
Insurance Companies	£96 3 0	
Institute Levies	56 19 0	
		153 2 0
,, Bank Interest		4 9 7
		£644 11 0

Cr.

By Journals—		
Printing Volume VII.	£247 18 6	
Publication Committee's Expenses ...	5 5 6	
		£253 4 0
,, Examinations—		
Printing and Stationery	£30 16 3	
Postages	4 12 1	
Clerical Assistance	15 0 0	
		50 8 4
,, General Expenses—		
Secretary's Salary	50 0 0	
Allowance for Office Expenses	15 0 0	
Postages and Petty Cash	13 0 0	
Printing and Stationery	4 2 0	
		82 2 0
,, Balance—		
Cash in Bank	258 7 8	
Cash in Hand	0 9 0	
		258 16 8
		£644 11 0

Audited and found correct.

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THE FEDERATION OF INSURANCE INSTITUTES
OF GREAT BRITAIN AND IRELAND.

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Founded 1887.

Objects: (1st) The reading of papers and delivering of lectures by members, or experts who are not members, upon subjects connected with Insurance business generally. (2nd) The discussion of all questions relating to such business. (3rd) The promotion of social intercourse amongst members of the profession in Birmingham and district.

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Established 1901.

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HON. LIBRARIAN—Hugh McLean, *Fire Underwriters' Association*.
HON. AUDITOR—B. Goldsmith, *China Traders'*.
HON. SECRETARY AND TREASURER—R. J. White, *Guardian*, 405 Collins Street.

INSURANCE CLERKS' ORPHANAGE.

Object: To maintain and educate orphan or necessitous children of Clerks and Officials of Insurance Companies who were Members of the Orphanage by placing such children at selected schools, and making money grants for their clothing, between the ages of 6 and 16.

Members and Subscribers may commence their Annual Subscriptions on any one of the following dates, viz.:—1st February, 1st May, 1st August, or 1st November, and all future Subscriptions will be due on the date so selected.

NOTE.—5s. annually qualifies for Membership. £3 3s. in one sum qualifies for a Life Membership.

THE FEDERATION OF INSURANCE INSTITUTES
OF GREAT BRITAIN AND IRELAND.

THE Tenth Annual Conference was held in De Keyser's Royal Hotel, Victoria Embankment, London, on Friday, 8th June, 1906. The President arranged the following Committee of Welcome on this the occasion of the first visit of the Federation to London :—

COMMITTEE OF WELCOME.

Charles Alcock (*Royal*).
E. Laughton Anderson (*London Guarantee and Accident*).
H. W. Andras (*Provident Life*).
E. Baumer (*Sun*).
C. A. Bathurst Bignold (*Norwich Union Fire*).
R. Chapman (*Caledonian*).
E. T. Clifford (*Law Accident*).
W. P. Clirehugh (*London and Lancashire*).
James Clunes (*London Assurance*).
H. Cockburn (*North British and Mercantile*).
E. Colquhoun (*Legal and General*).
J. A. Cook (*Scottish Union and National*).
G. S. Crisford (*Rock*).
J. J. W. Deuchar (*Norwich Union Life*).
T. C. Dewey (*Prudential*).
John M. Dove (*Liverpool and London and Globe*).
C. S. Gilman (*Norwich and London*).
W. H. Gregory (*Friends' Provident*).
J. E. Gwyer (*Provident Clerks*).
H. B. Guernsey (*Phœnix*).
James Hamilton (*Yorkshire*).
A. H. Heal (*State Fire*).

E. H. Holt (*Law Life*).
G. R. Jellicoe (*Eagle*).
Robert Lewis (*Alliance*).
Hugh Lewis (*Central*).
A. Mackay (*Law Union and Crown*).
Geoffrey Marks (*National Mutual*).
F. Norie Miller (*General Accident*).
E. Roger Owen (*Commercial Union*).
David Paulin (*Scottish Life*).
R. J. Paull (*Ocean*).
W. P. Phelps (*Equity and Law*).
Joseph Powell (*Union*).
W. T. Price (*North British and Mercantile*).
A. J. Relton (*Guardian*).
T. R. Ronald (*Law Guarantee and Trust*).
F. W. P. Rutter (*London and Lancashire*).
G. H. Ryan (*Pelican and British Empire*).
J. H. Scott (*Gresham*).
A. G. Scott (*English and Scottish Law Life*).
H. C. Thiselton (*Commercial Union*).
A. Vian (*Railway Passengers*).
W. J. H. Whittall (*Clerical, Medical, and General*).
H. E. Wilson (*Northern*).

Mr. Samuel J. Pipkin (General Manager and Secretary of the Atlas Assurance Company, Limited), President of the Federation, occupied the chair, and there were present:—

Ex-President and Hon. Treasurer—THOMAS A. BENTLEY (London and Lancashire Fire), Manchester.

Past Presidents—JAMES OSTLER (Northern), Manchester; F. DALTON (Norwich Union), Birmingham; S. G. MOXEY (Prudential), Bristol; DAVID L. LAIDLAW (North British and Mercantile), Glasgow; JOHN G. BOSS (Royal), Newcastle-on-Tyne.

Hon. Secretaries to the Examiners—A. W. SNEATH (Commercial Union), Leeds; W. HOLBROOK (Royal), Leeds.

Hon. Secretary to the Publications Sub-Committee—ARCHIBALD BLAIR (late London and Lancashire Fire), Glasgow.

Founder of Insurance Clerks' Orphanage—ALBERT D. BROOKES (Alliance), Bristol.

Examiners—W. BLAIR (Northern), Bristol; J. H. CHAPMAN (Norwich Union), Newcastle-on-Tyne; A. H. COWPE (Royal), Leeds; H. D. CURNICK (Norwich Union Fire), Manchester; A. GUTHRIE (Sun Fire), Glasgow; W. S. KINNEAR (Royal Exchange), Dublin; R. McCONNELL (Royal), Manchester; G. L. LAMBERT (North British and Mercantile), Manchester; W. G. NEISH (Northern), Newcastle-on-Tyne; W. RICHARDSON (Norwich Union), Edinburgh; J. B. ROBERTS (Sun Fire), Leeds; JOHN ROBERTSON (Northern), London; H. E. SOUTHAM (Ocean), London; A. GIBBON THOMSON (Life and Health), Edinburgh; A. D. L. TURNBULL (Scottish Widows' Fund), Edinburgh.

Secretary to the Federation—CHARLES STEVENSON, Manchester; and the following delegates:—

BIRMINGHAM - - -	A. E. PATRICK (*Westminster*), President. A. J. LEWIS (*Sun*). C. F. CARSON (*Patriotic*), Hon. Secretary.
BRISTOL - - -	A. F. TOOKE (*Westminster*), President. JAMES BOLTON (*Union*), Hon. Secretary. GRAHAME H. WILLS.
EDINBURGH - - -	DAVID PAULIN, F.F.A., F.R.S.E. (*Scottish Life*), President. HENRY BROWN (*Century*). D. M. CAMERON (*Alliance*), Hon. Secretary.
GLASGOW - - -	R. W. THOMPSON (*Northern Accident*). J. BUYERS BLACK (*Liverpool and London and Globe*). STEWART LAWRIE (*Alliance*), Hon. Secretary.
IRELAND - - -	W. P. SHERRIFF (*Northern*), President. R. Y. MURRAY WRIGHT (*Royal*). WILLIAM A. McCONNELL (*Caledonian*), Hon. Secretary.
MANCHESTER INSTITUTE -	JOHN LOUDON (*Royal Exchange*), President. J. N. CLYMER (*Atlas*). H. M. BENTLEY (*Western*), Hon. Secretary.
MANCHESTER ASSOCIATION -	W. H. HOYLE (*Westminster*), President. W. E. JONES (*Northern Accident*). CHAS. LAMBERT (*Legal and General*).

NEWCASTLE-ON-TYNE -	C. SHUTT (*County Fire*), President.
	JAMES HOPPER (*Sun*).
	F. F. WORTHINGTON (*Union*), Hon. Secretary.
NORWICH - - -	J. M'MULLEN BROOKS (*London.*)
	W. THOULESS (*Norwich Union*), Hon. Secretary.
NOTTINGHAM - - -	L. J. TOWLE (*Atlas*), President.
	S. A. BENNETT (*London*).
	H. W. SAUNDERSON (*Northern*), Hon. Treasurer.
YORKSHIRE - - -	F. J. ALLEN (*Atlas*).
	R. A. DIXON (*Liverpool and London and Globe*).

There were also present the following visitors:—

E. Baumer (*Sun Fire*).
J. H. Croft (*Royal*).
T. C. Dewey (*Prudential*).
H. Ernst Hall, Fire Offices Committee.
James Hamilton (*Yorkshire*).
E. B. Hiles (*Royal Exchange*).
G. R. Jellicoe (*Eagle*).
Alex. Mackay (*Law Union and Crown*).
G. S. Manvelle (*Sun*).
E. Roger Owen (*Commercial Union*).
O. Morgan Owen (*Alliance*).
R. J. Paull (*Ocean Accident*).
W. T. Price (*North British and Mercantile*).
A. J. Relton (*Guardian*).
A. Vian (*Railway Passengers*).

Apologies were received from:—

Past President—B. H. O'Reilly (*Patriotic*).

Examiners—J. H. Boocock (*Commercial Union*), Birmingham; Chas. D. Butler (*Royal Exchange*), Birmingham; S. Butler (*London and Lancashire Fire*), Newcastle-on-Tyne; J. P. Eddison (*North British and Mercantile*), Leeds; A. S. Fraser (*Commercial Union*), Dundee; James Gemmill (*Royal Exchange*), Glasgow; F. S. Goggs, A.I.A. (*Scottish Metropolitan*), Edinburgh; C. H. Green (*Sun Life*), London; N. B. Gunn, F.F.A., F.I.A. (*Scottish

Widows), Edinburgh; J. Mason Guttridge (*Alliance*), Bristol; W. Hartley (*London and Lancashire Fire*), Manchester; James Haslam (*Ocean*), Nottingham; C. E. Howell, LL.D. (*Standard*), Dublin; Owen D. Jones (*London and Lancashire Fire*), Leeds; P. L. Newman (*Yorkshire*), York; H. J. Pearce, F.F.A. (*Scottish Amicable*), Glasgow; H. Pocklington (*Commercial Union*), Leeds; C. A. Bathurst Bignold, D.L., J.P. (*Norwich Union Fire*), Norwich.

After the adoption of the minutes of last Conference, the Secretary read the following

REPORT FOR THE YEAR 1906.

The year just closed contains two features of great importance to the Federation and promise for the future. Founded in the provinces ten years ago for educational purposes, it has by a natural growth gradually attracted the attention of a wider circle, and for the first time has met in London, presided over by the General Manager of one of our leading Fire and Life Offices. The Annual Conferences have now been held in most of the insurance centres of the kingdom out of London, but this year the delegates are invited to the Metropolis by their President and a most influential Committee of Welcome. With no ambitious aims but to do sound and lasting benefit to the profession, the promoters of the Federation have thus early seen in this invitation and welcome an appreciation of their labours by the heads of the profession, which they acknowledge with much satisfaction.

The other distinguishing feature of the year is the preliminary steps which have been taken towards Incorporation, and eventually, it is to be hoped, the obtaining of a Royal Charter. This matter was discussed at a meeting of the Executive Committee, and as a result a special Committee was appointed to make full inquiries, and their Report is presented for consideration of the Conference.

The Departmental Reports to be submitted to Conference all point to the continued prosperity of the Federation and the increasing interest taken in its operations by an ever-widening circle. The financial statement to be submitted by

the Hon. Treasurer is encouraging, the balance having increased during the year from £212 14s. 1d. to £258 16s. 8d., and in addition there is a large stock of Journals representing an asset of considerable value.

The eighth volume of the Journal contains 16 original papers, of which 10 are devoted to fire insurance and six to life assurance. The subjects are selected with discrimination, and the volume generally adds one other instalment to the rapidly-increasing store of technical papers, the value of which is evinced by the growing demand for the Journal. The ninth volume is already well in hand, and it is hoped to issue it before the close of the present year. Attention may be directed to the renewed request of the Publications Committee that authors of papers for the Journal return proofs promptly so as to assist the editors in getting out the volume earlier.

The report of the Executive Committee of the Examiners, and the supplementary reports of the results of the examinations, all show the wide interest taken in this, perhaps the most important part of the work of the Federation. Not the least satisfactory feature of the report is the record of 41 offices from which the candidates are drawn.

The Insurance Institute of Victoria, Melbourne, was affiliated by resolution of the Executive on 21st October. This makes the fifth Colonial Institute which has joined the Federation.

Since last Conference an Insurance Institute has been formed in Cardiff, and in due time application for membership may be expected from it.

The Insurance Clerks' Orphanage continues to make satisfactory progress. Fourteen children are now receiving the benefits of the Institution, and the total funds amount to £10,557.

The cordial thanks of the Executive are offered to all who have contributed to the welfare of the Federation during the past year; to the President for his invaluable services in the position which he has so well used for the advancement of the best interests of the undertaking, as well as for his uniform

courtesy and ready help at all times; to the members of the Committee of Welcome for the interest they have taken in the Federation; to the Honorary Treasurer for his careful management of the finances; to the Examiners and their two honorary secretaries for their labours, the extent of which can hardly be guaged, but which are not the less appreciated; to the Publication Committee for their exacting labours in preparing and editing the Journal; and, finally, to the Insurance Press for the readiness with which every publicity is given to all matters concerning the work of the Federation.

The PRESIDENT (Mr. Samuel J. Pipkin) then addressed the Conference as follows:—Gentlemen,—Courtesy and sincerity alike dictate that my first word to-day should be one of modest acknowledgment of the honourable position I occupy at this moment through the overwhelming kindness of the members of the Federation. It is an honour I neither sought nor coveted; and while it excites my grateful appreciation, it also provokes a perplexing wonder. However, the responsibility of your choice is not mine; but there rests upon me the duty of attempting to the best of my ability to save you from reproaching yourselves for having elected me President of the Federation. My next word must be one of welcome, of hearty welcome, to this Conference. And I now speak for others—the leaders in the business of insurance in this country, many of whom have gladly lent their names, and others have come in person, and still others will come as the day wears on, to show you that they value your work, admire your efforts, and desire to convince you of their practical sympathy with your aims and with the methods of the Provincial Institutes, which are the bones and muscle and sinews and blood—the vital constituents of this Federation. They are glad to see the Conference in London and to be brought into touch with the men who for years have not only been dreaming dreams, but zealously, hopefully, believingly, strenuously acting with one accord to perfect the insurance workman by giving him facilities for learning his craft and

practising it with a trained intelligence and something of scientific knowledge.

Men may be born poets, but they are not born underwriters. Genius may or may *not* be intuitive, but certain it is that the knowledge of risks, rates, F.O.C. rules and warranties, the laws of probability, or the safe inferences which experience may justify, are not elements of maternal nourishment or of the mystic infusion of paternal capacity.

The founders of the Local Institutes realised this truth, and also the fact that neither the branch office with its overworked manager harassed by head office injunctions and requirements, nor the chief office with its general manager irritated by the respectful but disputatious zeal of his branch manager to properly understand his oracular but impossible instructions, afford adequate opportunities for teaching more than the mere rudiments of our business, and hardly those on anything like an ordered and intelligible plan.

The persistent and self-sacrificing efforts of the brave pioneers of these Local Institutes, some of whom we see here to-day, have been crowned with success. That success is their own—*your* own—achieved with all too little of head office support, not withheld from want of sympathy but from want of time, and from the inconvenient physical arrangement of the universe which allows the existence of distance and space and demands time for corporeal transit. If our bodies could have been ubiquitous as our thoughts you would have had much help, much criticism that might *not* have helped, and perhaps some interference, which, though offered with the best intentions, would, I fear, have made you welcome a little more abstention.

You have been left pretty much alone to work out your own salvation—the salvation of the idea of personal official association for purposes of teaching and helping the younger officials. You *have* saved the idea; it is embodied in the unselfish work of busy men, who recognise that it is the loftiest human function to serve the race. To-day it receives the sanction of those who, officially having the first call on your time and talents, admit by their presence and their

names here that in devoting yourselves to the work of perfecting the individual instruments by which insurance is carried on you have as faithfully served your companies as when you are capturing a fleeting customer, pointing out the defects of a tariff, discovering an error of head office, or piling up the premium income, which, whatever it does for your companies, will bring profit to you and your agents.

This is a sort of day of atonement, gentlemen, when the high priests of the profession prostrate themselves before the altar of your devotion and render homage to the spirit of humanity which has animated your efforts and elevated the insurance species. A day of atonement, did I say? Let us analytically pronounce the word to show its meaning. A day of at-one-ment, when, to change the metaphor, the bishops and deans and canons and clergy are united on the same platform with a common object. *At one* in approving what has been done already, though not done by all; *at one* in desiring that this Federation of Institutes may succeed in attaining a sphere of greater usefulness by securing itself a local habitation as well as a name; *at one* in hoping that the deliberations of this Conference, on this its first meeting in London, may push on a step or two at least, if they do not actually fully realise, the project which is foreshadowed on the agenda—a project designed entirely to strengthen and put on a permanent basis the respective Local Institutes by affiliating them to a central organisation with its headquarters in London, which organisation shall have a legal status by becoming a legal entity, controlled, guided, and administered by representatives from the respective Provincial Institutes working with London officials, the one rendering local knowledge and the other imperial influence and experience—the whole governing authority seeking the one object of creating and maintaining an Institution that shall afford teaching facilities to, and direct the studies and test the efficiency of, those engaged in our business; provide a technical library; keep a register of men and their qualifications, so that talent and capacity may be economised and spread by bringing together those who seek appointments and those who seek

men; and, perhaps most appreciated of all, by giving its diploma to those who have passed its examinations—a diploma which shall be as certain and accepted a proof of efficiency and knowledge in insurance business as are the diplomas of the learned societies and the institutes connected with other branches of commerce.

This, I think, is the most appropriate occasion on which to discuss so important a project, for, although there are powerful companies outside London, it is, I think, the first city in the Empire as the headquarters of insurance, and with the presence of general managers at this Conference—the first London Conference of the Federation—we shall welcome the advantage and benefit of their views. We realise that unless the head offices will join hands with the Local Institutes through the medium of a London Incorporated Institute, to perfect or absorb this Federation and to assume something of the nature I have sketched, the project cannot reach its largest sphere of usefulness.

You, gentlemen, have laid the foundations, we believe solidly and wisely; now you generously ask your chiefs to come to your aid and share in the work and the honour of erecting the superstructure, so that it may be fair to look upon, harmonious in proportions, and creditable in design, a centre of light and influence to the coming generations of insurance men. And I am greatly mistaken if your appeal to London should be in vain. Did ever any good thing appeal to this city in vain? Money-bags are not our only gods, and the best sons of London have ever recognised that a good name is better than riches, and that the service of our fellow-men is a joy as well as a duty.

Gentlemen, officers of the Federation, delegates to this Conference, and friendly visitors who have so kindly supported me, I have spoken enough. My object was to inspire, not to weary; and so, to repeat my acknowledgments of the honour and kindness you have shown me, I will conclude with the Egyptian salute of silent motions, which, being interpreted, means—My heart beats towards you; my lips shall ever sing your praises; my memory shall hold you in grateful recollection.

THE INSURANCE CLERKS' ORPHANAGE.

REPORT OF THE GENERAL COMMITTEE TO THE FOURTH ANNUAL GENERAL MEETING OF MEMBERS, TO BE HELD AT THE REGISTERED OFFICE OF THE INSTITUTION, 11 QUEEN STREET, CHEAPSIDE, E.C., ON THURSDAY, 7TH JUNE, 1906, AT 5 O'CLOCK.

THE General Committee have much pleasure in submitting their Fourth Annual Report to the members of the Orphanage, together with Accounts and Balance Sheet made up to the 31st March, 1906.

The total amount received during the year was £1945 16s. 2d., being an increase of £300 15s. 3d. on the figures of the previous year. In accordance with the Articles of Association, the Life Membership Subscriptions and Donations exceeding £20 each, amounting together to £689 6s., have been carried to capital, increasing that account to £7145 0s. 7d.

The other receipts, consisting of Annual Membership Subscriptions, Donations of under £20 each, and Interest, amounted to £1246 10s. 2d., as against £1063 12s. 11d. in the previous year, and represent revenue.

The total revenue balance is £3412 4s., as compared with £2428 13s. 9d. in the previous account.

The Life Membership Subscriptions of £165 15s. were received from 26 new Life Members and from 11 Annual Members who had decided to commute their payments. Annual Members contributed £771 6s. 6d., of which £148 10s. 6d. represents the subscriptions of 303 new members, the balance being renewed subscriptions.

During the year 329 new members were admitted, the total membership (allowing for lapsings and deaths) standing at 2604.

Entertainments and other social functions in different parts of the kingdom rendered substantial assistance. The General Committee acknowledge with thanks contributions from the following sources:—

Birmingham Insurance, Smoking Concert -	£21	1	0
Hull Insurance, Smoking Concert - - -	3	2	4
Irish Insurance Institute, Smoking Concert -	17	10	0
Yorkshire Insurance Institute, Smoking Concert - - - - - - - -	8	12	6
British Equitable Cinderella Dance - -	19	2	0
Commercial Union Assurance Company, Staff Smoking Concert - - - - - -	10	0	0
Guardian Assurance Company, Staff Smoking Concert - - - - - - - -	13	12	10
Phœnix Fire Office, Staff Smoking Concert -	13	11	0
Gresham Life Office Cricket Club - - -	5	13	6

The General Committee record with pleasure that during the year three companies, the Guardian Assurance Company, the Norwich Union Fire Insurance Society, and the Norwich Union Mutual Life Insurance Society, contributed £100 each. Eighteen companies have now, since the institution of the Orphanage, contributed the following donations:—

Atlas Assurance Company - - - -	£100
Caledonian Insurance Company - - -	100
Commercial Union Insurance Company -	100
County Fire Office - - - - - -	100
Guardian Assurance Company - - -	100
Liverpool and London and Globe Insurance Company - - - - - - -	100
London & Lancashire Fire Insurance Company	100
Northern Assurance Company - - -	100
Norwich Union Fire Insurance Society -	100
Norwich Union Mutual Life Insurance Society	100
Phœnix Assurance Company - - -	100
Provident Life Office - - - - - -	100
Scottish Union and National Insurance Company - - - - - - -	100

Sun Fire Office - - - - - - -	£100
Union Assurance Society - - - - -	100
Westminster Fire Office - - - - -	100
Essex & Suffolk Equitable Fire Insurance Company - - - - - - -	26 5s.
State Fire Insurance Company - - - -	21

In addition to the foregoing, the General Committee thankfully acknowledge many personal contributions from directors of the various offices.

The total expenditure amounted to £262 19s. 11d., of which £219 10s. was for grants on account of orphans, the balance of the expenditure, £43 9s. 11d., representing working expenses.

The sum of £1944 5s. 3d. was invested during the year, making the total investments of the Orphanage £10,180 16s. 8d.

In the course of the year eight orphans were accepted, so that at 31st March last fourteen children were receiving the benefits of the Institution. In the light of these and subsequent events the General Committee feel that their prediction set forth in the last report, as to the resources of the Institution being fully employed, is likely to receive an early fulfilment.

In this connection your Committee, in fairness to those members who have supported the Institution from its earliest days, have had under careful consideration the question of continuing to admit new members at the present minimum subscription. The adoption of an entrance fee has been suggested. Although no proposal is now put forward, it is felt that the members will have, sooner or later, to deliberate upon and decide this question.

The General Committee again tender their thanks to the members of the respective Local Committees and to the Collectors in the various offices, to whose energy and enthusiasm so large a share of the present gratifying position of the Institution is due.

The General Committee also tender their acknowledgments to the Honorary Auditors for their services, to the Committee of the London Salvage Corps for the free use of their premises, and to the Insurance Press for gratuitous advertisements and publication of information respecting the Orphanage.

The following members of the General Committee retire in accordance with the Articles of Association, and, being eligible,

offer themselves for re-election, viz.: Messrs. F. Dalton, H. B. Guernsey, J. Hamilton, J. Haslam, R. B. Lemon, and Alex. Mackay.

The retiring Auditors, Messrs. Price, Waterhouse, & Co., being eligible, offer themselves for re-election.

SAML. J. PIPKIN, *Chairman.*

26th May, 1906.

THE FOLLOWING STATEMENT SHOWS THE PROGRESS OF THE ORPHANAGE:—

Year ending 31st March.	Number of Members.	Subscriptions and Donations, &c.							Total of all Income.	Expenditure.		Balance at end of each year—Capital and Revenue.
		Life Members.	Donations over £20.	Total to Capital.	Annual Members.	Donations under £20 and Subscriptions.	Interest.	Total to Revenue		Grants.	Working Expenses.	
		£	£	£	£	£	£	£	£	£	£	£
1903	2,007	3,412	1,009	4,421	629	411	24	1,064	5,486	8	221	5,256
1904	2,304	531	922	1,453	683	169	138	990	2,443	72	125	7,503
1905	2,527	143	438	581	719	139	205	1,063	1,645	118	145	8,885
1906	2,604	166	523	689	771	209	266	1,246	1,935	219	43	10,557

PARTICULARS OF CASES RECEIVING THE BENEFITS OF THE INSURANCE CLERKS' ORPHANAGE ON 31st MARCH, 1906.

Admitted.	Sex.	Born.	Father.
March 11th, 1903 ...	Boy	December 6th, 1896	Clerk, Sun, Head Office.
July 8th, 1903	Boy	July 17th, 1892	Clerk, Westminster Fire, Head Office.
July 8th, 1903	Girl	March 19th, 1895	Clerk, Westminster Fire, Head Office.
June 8th, 1904	Boy	May 13th, 1898	Clerk, Westminster Fire, Head Office.
January 11th, 1905 ...	Girl	December 23rd, 1898... ...	Clerk, British Law, Head Office.
February 9th, 1905 ...	Boy	October 25th, 1896	Clerk, N. B. & M., Head Office.
November 8th, 1905 ...	Girl	March 19th, 1895	Clerk, Norwich Union Life, Bristol.
November 8th, 1905 ...	Girl	September 7th, 1898	Clerk, Norwich Union Life, Bristol.
December 13th, 1905 ...	Boy	January 6th, 1897	Inspector, Provident Life & County Fire, Head Office.
December 13th, 1905 ...	Boy	November 6th, 1897	Inspector, Provident Life & County Fire, Head Office.
December 13th, 1905 ...	Girl	March 2nd, 1896	Clerk, Alliance Marine, Liverpool.
December 13th, 1905 ...	Boy	February 6th, 1899	Clerk, Alliance Marine, Liverpool.
December 13th, 1905 ...	Boy	August 27th, 1896	Clerk, Alliance Marine, Liverpool.
March 14th, 1906 ...	Boy	January 30th, 1900	Inspector, Provident Life & County Fire, Head office.

THE INSURANCE CLERKS' ORPHANAGE.

INCOME and EXPENDITURE ACCOUNT for the Year ending 31st MARCH, 1906.

INCOME.

	£ s. d.	£ s. d.
To Balance brought forward from last Account		£2,428 13 9
,, Subscriptions from Life Members ...	£165 15 0	
,, Donations of £20 and upwards ...	223 11 0	
,, Donations from Insurance Companies	300 0 0	
		689 6 0
,, Annual Subscriptions from Members	£771 6 6	
,, Donations under £20	209 3 8	
,, Interest on Investments and on Money on Deposit	266 0 0	
		1,246 10 2
		£4,364 9 11

EXPENDITURE.

	£ s. d.
By Transfer to General Capital Account in accordance with the Articles of Association of the Orphanage	£689 6 0
,, Working Expenses, Stationery, Printing, Postages and Petties, &c.	43 9 11
,, Grants	219 10 0
,, Balance carried to Balance Sheet	3,412 4 0
	£4,364 9 11

BALANCE SHEET, 31st MARCH, 1906.

To General Capital Account as at 31st March, 1905	£6,455	14	7			
Add Amount received during the Year, being Life Subscriptions, and Donations of £20 and upwards	689	6	0			
				£7,145	0	7
,, Balance of Income and Expenditure Account				3,412	4	0
,, Outstanding Accounts				8	5	8
				£10,565	10	3

By Investments at cost:—						
£5000 2½ per Cent. Consols ...	£4,622	10	2			
£1016 16s. Birmingham Corporation 3 per Cent. Stock	1,001	2	3			
£500 New South Wales 3½ per Cent. 1918 Stock	481	18	6			
£500 London, Brighton & South Coast Railway 5 per Cent. Consolidated Preference Stock	697	18	3			
£500 North-Eastern Railway 3 per Cent. Debenture Stock	487	7	9			
£1500 Cape 3½ per Cent. Inscribed Stock	1,436	8	0			
£500 Natal 3½ per Cent. Consolidated Stock	490	1	0			
£500 London County 3 per Cent. Consolidated Stock	465	7	3			
£500 New South Wales 3½ per Cent. New Inscribed Stock, 1930–1950	498	3	6			
				£10,180	16	8
,, Cash at Bank, Current Account ...	£376	3	6			
,, ,, in hand	8	10	1			
				384	13	7
				£10,565	10	3

AUDITORS' CERTIFICATE AND REPORT.

In accordance with the provisions of the Companies Act, 1900, we certify that all our requirements as Auditors have been complied with.

We have examined the above account of Income and Expenditure for the year ended 31st March, 1906, and the Balance Sheet as at that date with the books and vouchers of the Institution, and report to the Members that in our opinion the Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Institution's affairs, as shown by the books.

We have verified the Investments appearing in the Balance Sheet.

PRICE, WATERHOUSE, & CO., *Auditors.*

19th May, 1906.

THE FEDERATION OF INSURANCE INSTITUTES

OF GREAT BRITAIN AND IRELAND.

Founded 12th March, 1897. Constitution agreed to, 12th June, 1903.

CONSTITUTION.

1. The organisation shall be called "THE FEDERATION OF INSURANCE INSTITUTES OF GREAT BRITAIN AND IRELAND." Title.

2. The objects of the Federation are to encourage the study of all subjects bearing on every branch of Insurance, to promote the technical education of junior Insurance officials, and to do all such things as may be deemed desirable to advance the welfare and efficiency of the Insurance profession. Objects.

3. The Federation shall consist of Institutes, Associations, or Societies in Great Britain and Ireland established for the above-named purposes. Membership.

4. The Institutes now forming the membership of the Federation are the following, viz. :—

The Insurance Institute, Manchester.
The Insurance and Actuarial Society of Glasgow.
The Insurance Association of Manchester.
The Insurance Institute of Ireland.
The Norwich Insurance Institute.
The Birmingham Insurance Institute.
The Insurance Institute of Yorkshire.
The Insurance Institute of Bristol.
The Insurance Institute of Newcastle-upon-Tyne.
The Nottingham Insurance Institute.
The Insurance Society of Edinburgh.

5. Insurance Institutes established abroad or in any of the Colonies or Dominions of the British Empire may be affiliated

with the Federation on such terms and conditions as may be provided by the Constitution and Bye-laws, but shall have no control in the management.

6. The Institutes now affiliated with the Federation are :—

The Insurance Institute of Toronto.

The Insurance Institute of New Zealand.

The Insurance Institute of Montreal.

The Insurance Institute of South Africa.

7. The admission of new Institutes to the Federation, or of Institutes applying for affiliation, shall be by the unanimous vote of the Conference.

8. Subscribers of not less than One Guinea per annum to the Funds of the Federation shall be eligible as Honorary Members. They shall be entitled to two copies of the "Journal" for each guinea subscribed, and a list of all Honorary Members shall be published in the "Journal" each year.

Operations. 9. The operations of the Federation shall be regulated by an Annual Conference and an Executive Committee elected thereat, with such Special and Sub-committees (the Honorary Secretaries of which shall be appointed by the Conference) as may from time to time be determined upon, and may include

(*a*) The publication of a "Journal,"

(*b*) The holding of Examinations,

(*c*) The offering of Prizes for essays or research in any subject bearing on Insurance business,

(*d*) The formation of a Library of Insurance works,

(*e*) The encouragement and support of the Insurance Clerks' Orphanage and/or other charitable institution which may commend itself to the Conference, or

(*f*) Any other matter which in the opinion of the Conference may be considered desirable for the general welfare of the Federation or the Insurance profession.

Office-bearers. 10. The Office-bearers shall consist of a President, an Honorary Treasurer, and a Secretary, and of the Honorary Secretaries to all Special or Sub-committees, and shall be elected annually by the Conference, which shall also fix the remuneration of the Secretary. It shall be competent to the Conference to delegate to any Special or Sub-committee the election of one of its number as Honorary Secretary to such Special or Sub-committee.

Executive Committee. 11. The Executive Committee shall consist of two Delegates from each Institute, Association, or Society embraced in the Federation

in full membership, together with the Honorary Secretaries to all Special and Sub-committees and any others who may be appointed from time to time by the Annual Conference.

12. Any vacancy occurring in the Office-bearers or Executive shall be filled up by the Executive Committee at a meeting specially summoned for that purpose, and the appointments so made may continue in force until the next Conference. Vacancies.

13. The Examiners shall be elected annually by the Conference. Examiners.

14. The Annual Conference shall consist of the Office-bearers, the President of each Institute, all Past Presidents, the Examiners for the time being of the Federation, the Honorary Secretaries of Special and Sub-committees, the Founder of the Insurance Clerks' Orphanage (for his lifetime), the Chairman for the time being of the Orphanage, the Honorary Secretary of the Institute at which the Conference is held, and two Delegates from each Institute. Annual Conference.

15. At all Meetings of the Conference and the Executive Committee the Chair will be taken by the President, or, in his absence, by one of the Past Presidents, whom failing the Chairman shall be elected from among those present.

16. All voting at the Annual Conference and at meetings of the Executive Committee shall be by Institutes, one vote only being allowed to each Institute, the President having a casting but not a deliberative vote. Voting.

17. The Conference shall not exercise any authority or control over any Institute, Association, or Society embraced in the Federation except in matters directly relating to the interests of the Federation, and if any question arise in connection with this Article it shall be decided by a vote of the Conference, two-thirds majority to decide the question, which must appear in the Agenda. Authority of Conference.

18. It shall be in the province of the Federation in Conference assembled to censure any Institute, Association, or Society, or terminate its membership, should it fail to effectively maintain the objects above set forth, or introduce any practice deemed to be inconsistent therewith, or otherwise infringe any part of this Constitution, or the membership of which may be deemed to be no longer advantageous to the Federation.

19. The duties of the Secretary shall be to keep the Minutes of the Executive Committee and of the Conference, to prepare the Agenda for the same, to send out Notices of all meetings, to assist all Sub-committees when required in any of their duties, to con- Duties of Secretary.

duct the correspondence of the Federation, and generally to do all such things as usually pertain to the duties of his office.

Honorary Treasurer. 20. The Honorary Treasurer shall receive and give receipts for all moneys due to the Federation, and shall pay all just debts and demands owing by the Federation, and shall render an account of the same each year to the Annual Conference, such account to be made up to the 31st December in each year, and to be printed and sent by the Secretary to the Delegates a clear week before the Annual Conference.

Funds. 21. The funds of the Federation shall be derived from

(*a*) A levy laid on each of the Institutes, Associations, or Societies embraced in the Federation, the amount of such levy to be decided each year by vote of the Conference,

(*b*) The profits accruing from the sale of the "Journal," the price of which shall be fixed each year for Members and Non-Members by the Conference,

(*c*) Subscriptions received from affiliated Institutes, from Insurance Offices, and from Honorary Members.

22. The funds of the Federation may be used for any of the following purposes:—

(*a*) Printing of the "Journal" and of all reports, circulars, certificates, or other documents authorised by the Conference or Executive.

(*b*) Salaries of the Secretary or other officials authorised by the Conference.

(*c*) Any other object which may from time to time be ordered by the Conference as conducive to the well-being of the Federation in promoting its operations, as defined in Rule 9.

Meetings. 23. The Conference shall meet each year in the month of May or June in such convenient centre as may be decided by the Conference from year to year.

24. The Executive Committee shall meet at such times as may be required by the necessities of business to be transacted, and the place of meeting shall be left to the decision of the President for the time being of the Federation.

25. Fourteen clear days' notice shall be given of all meetings of the Annual Conference and of the Executive, and the Notice calling the meeting shall state the principal business which is to be brought forward; but after the business stated

in the Notice convening the meeting has been finished, it will be competent for any Delegate to introduce any other business for discussion only with the consent of a majority of votes.

26. The Executive Committee shall be called at any time by the Secretary on a requisition from three or more Institutes, and such requisition must state the object for which the meeting is requested. At such Special Meetings of the Executive, the only business which may be transacted will be that stated on the Notice as the special business for which the meeting has been called.

27. The meetings of all Special and Sub-committees shall be called by the Honorary Secretary of each at such times and places as may be most convenient.

Duties of Executive.

28. It will be the duty of the Executive Committee to exercise during the year such control over the work of the Federation and of all Sub-committees as may be desirable, to assist and direct when necessary such work, to deal with all matters on which an immediate decision may be required in the interest of the Federation, and to report to Conference.

Reports for Conference.

29. Reports of all Special and Sub-committees to be submitted to the Conference shall be printed and in the hands of Honorary Secretaries of each Institute embraced in the Federation and Delegates one clear week before the date of meeting of the Conference.

30. The Publications Sub-committee shall submit to the Conference each year a printed report of its operations, with a list of proposed papers for the forthcoming volume of the "Journal," and any other suggestions connected therewith.

31. Subject to the provisions of the Constitution and Bye-laws and for the purpose of promoting the objects of the Federation, the Conference shall cause Examinations to be held at such places as it may think fit, and shall prepare and publish Rules to regulate such Examinations, and to define the cases and circumstances under which the said Examinations shall severally apply, the subjects which they shall respectively comprise, the fees, if any, which shall be paid or deposited by candidates in respect of such Examinations, and the nature of the certificates, if any, to be granted to successful candidates. It may vary or rescind from time to time any of the said Rules of Examination, or add thereto, in any such manner as it may think fit, and may delegate to any Committees or Sub-committees such powers and instructions as may be necessary to carry out these objects.

32. The Honorary Secretaries to the Examiners shall submit to the Conference each year a printed report of the results of the examinations, with recommendations for the examinations in the following year, and any other suggestions connected therewith.

Audit.

33. The Treasurer's statement of accounts shall be audited each year by two honorary auditors to be elected by the Conference annually.

Bye-laws.

34. The Conference shall make and alter such Bye-laws (not inconsistent with the Constitution) as may from time to time be found necessary, but two months' notice of any Bye-law to be proposed by any Institute, or of any alteration in an existing Bye-law, must be given to the Secretary, who shall forthwith intimate the same to the Honorary Secretary of each Institute embraced in the Federation.

35. All Bye-laws and alterations thereof must be sanctioned and approved by a vote of the Institutes represented at the Conference, a majority of two-thirds being necessary.

Alteration of Constitution.

36. No alteration or addition shall be made to the Constitution except at the Annual Conference, and two calendar months' notice must be given to the Secretary in writing of any such proposed alteration or addition, and it will be the duty of the Secretary to send copies of such proposed alteration or addition forthwith to the Honorary Secretary of each Institute embraced in the Federation.

37. No alteration or addition to the Constitution shall be made unless sanctioned by a majority of two-thirds on a vote of Conference.

BYE-LAWS.

1. Institutes affiliated with the Federation shall be charged an annual subscription to be determined by Conference, and shall be entitled to one copy of the "Journal" each year per member at the same price as is charged to the members of Institutes constituting the Federation plus the cost of carriage.

2. Should a vacancy occur in any Special or Sub-committee of the Federation, or Examiners, it will be competent for such Special or Sub-committee to fill up the vacancy till the date of the next Conference.

3. The President and Secretary of the Federation for the time being shall be *ex-officio* members of all Committees and Special or Sub-committees of the Federation.

4. Should the Delegate duly appointed to attend a meeting of the Executive Committee or Conference be unable to attend, the Council of the Institute may send, as a substitute, any member of the Institute.

5. At meetings of the Executive Committee, six shall form a quorum provided that they represent not less than four Institutes. The quorum for all Special or Sub-committees shall be decided by each.

6. Candidates for the Examinations in the Fire Department must be in the employ of an Insurance Company (otherwise than a Fire Insurance Company which is not a member of the Fire Offices Committee).

7. The names of all Offices subscribing to the Federation shall be published in the "Journal" annually, also the results of the Examinations and the Examination papers.

8. Each Institute is entitled to have one copy of the "Journal" for each of its members at the reduced price as fixed by the Conference annually, it being a condition of obtaining such copies at the reduced price that no member of any Institute shall be charged more than the reduced price, as fixed by the Conference, for his copy, and that no additional copies, whether applied for by members of Institutes or others, may be supplied at less than the published price.

9. The higher officers of Insurance Companies and representatives from any affiliated Institute or any other person of distinction may be invited to the Conference by the President for the time being with the consent of the Executive.

*** *For all statements made, and opinions expressed, in the papers of this volume, the respective writers are alone responsible.*

LIFE ASSURANCE—SOME MODERN ASPECTS OF COMPETITION: NOTES ON ASSURANCES WITHOUT MEDICAL EXAMINATION AND OTHER SCHEMES PRESENTLY IN VOGUE.

By **WILLIAM RICHARD M'ILVENNA, F.F.A.**

A Paper read before the Insurance Institute of Ireland, 9th March, 1906.

In the notes which follow I shall endeavour to treat of some of the broader aspects of competition, dealing shortly with its effects in enlarging privileges, in increasing commissions, etc. I shall also claim attention on a few heads which bear only indirectly on the subject in hand, excusing myself for the divergence on the ground that it is difficult to measure the force of these indirect bearings, which are often more active than we might at first imagine.

Competition, however beneficial in many respects it may have been, has, we submit, deprived Offices of many items of profit which in past times contributed to their bonus-earning capacities. Formerly, failure to pay a premium meant complete forfeiture; death claims were delayed in payment for three or even six months; large foreign extras were charged; death by suicide was barred. But now we no longer have the benefit of these faithful miscellaneous sources of profit, for a policy-holder discontinuing his payments does not lose "his all," most Offices allowing fair and some exceptionally liberal values on surrender; extras for foreign residence, when charged at all, are not only lower but payable for shorter terms; sums assured, as a rule, become due immediately on proof of death and title; endowment assurances mature on the anniversary of the due date of the last premium without the tedious delay for the birthday; and suicides are generally allowed after a very short interval.

The changes referred to above are, to my mind, improvements of practice; but competition has also its sins to answer for. It has led to the devising of no end of "fancy" schemes, where the standard article—the whole life or ordinary endowment assurance—is so loaded with contingent contracts of varying natures as to be almost lost in their midst, and where the bonus is allotted in a manner probably quite heterogeneous to the contract to which it accrues. These conglomerate schemes frequently make comparison impossible, even to those able to analyse and reduce them; and at times one would almost be inclined to suspect that they had been framed with that end in view.

What has been aptly described as the competition of the "long purse" is perhaps the greatest evil we have to contend with. If all we hear be true, we may well ask ourselves if there is *any* superior limit to the function commission. At times one feels inclined to regret that the old 10 per cent. and 5 per cent. commission was ever superseded by a scale giving a much greater recompense for the securing of a *new* policy-holder, but few of us will deny that if the intention is to remunerate according to labour the first commission may reasonably bear to the renewal a greater ratio than 2 to 1. It would almost appear, however, that the £1 and 2½ per cent. itself were now passing into history; but mark the difference, the change no longer represents a practically *equivalent substitution*, but an actual and substantial increase. I question if high commissions attract the best class of business.

Until recently we have had only one party acting between the insurer and about-to-be-insured; but an extra middleman in the shape of a broker with special terms of commission, having his own sub-agents, has made his appearance. The broker has a fair case to put before his friends, who are themselves insurance agents, for the latter can oblige him without personal sacrifice, it being equally convenient to send proposals to a Company through the broker as directly.

The tendency is, when an Office does not rigidly adhere to a fixed commission basis, that a greater and greater proportion of its business will be paid for on its *maximum* scale of remuneration; and Offices allowing exceptional terms must be prepared, in the long run, to make exceptions of *all* their agents. In illustration of this, I remember meeting an Inspector who positively boasted that whenever he came in contact with an agent for a Company

which paid one representative more than another, that inspector made a point of inquiring on what scale the agent was paid. If it turned out that he was lowly paid the Inspector supplied examples of fellow-agents receiving higher commissions from the same Office. Without stopping to inquire into the conduct of the intermeddler, let us consider the effect of his news on the agent. If the latter has already introduced business, he not unnaturally begets the firm impression that he has been *done* out of 10s. a hundred, or whatever the difference may be. Should he have cases in prospect it is more than likely he will insist on receiving the increased terms, or take his clients elsewhere, preferring to accept the lower rate if he is satisfied that it is the *maximum* of the Office with which he deals. Many Offices allow a bonus to good agents at the end of their year's work, and I do not wish any objection to such a practice to be read into the preceding remarks. On the contrary, I think it an excellent and most encouraging plan, *provided* it is *incorporated* in the ordinary commission scale, and is in no way contingent on being applied for.

It is a pity that those who are making a stand in the direction of keeping down expenditure are not more loyally supported. One evil attendant on large initial commission, more especially if no renewal attaches, is the tendency to encourage lapse. It has been repeatedly shown that withdrawal after one year's payment frequently means an absolute loss, and it will appear presently that the first year's lapses are a considerable item. I regard the lapse element as an unmitigated evil, and my idea would be to make the first few years of a policy's life the most attractive in its existence. It will readily be appreciated that after this initial period a man being fully alive to his own interests will maintain his cover, and we may rest assured that if we guard carefully, say, the first quinquennium, the remainder of the term will look after itself.

And how could we nurse a policy in its tender years? To begin with, we might make bonuses at the rate last declared, or at a fixed rate, vest at once, so that there is never a period when a man is insured for his *bare £100*, and it would be a good plan to deliver a certificate for the first year's bonus along with the policy. The bonus on which the assurance started would be maintained at the same annual rate up to the first distribution, and thereafter the policy could take its ordinary chances. We might also arrange the guaranteed surrender values with a view to

continuance for at least a quinquennium, by a *substantial* increase in value at the end of that interval, the values hitherto having been correspondingly low. These would seem to be direct incentives to tempt the policy-holder to keep up his assurance. Perhaps the most effective means of securing our aim, however, would be to arrange the agency system with a view to the *conserving of the business* as well as the obtaining of new policies. This might be helped by spreading the large initial commission over the first three years, giving ten shillings per cent. in each of these years and 2½ per cent. thereafter. Such a rate would probably not cost more than the ordinary £1 and renewal, for we know that withdrawals are heavy in the early years, and specially so in the first year. The statistics relating to withdrawal in the British Life Offices Experience, 1893, show that in endowment assurances effected at the age of 30 there are about 9 per cent. of withdrawals at the end of the first year, and 4½ per cent. at the end of the second year; by the fifth year the surrenders have dwindled down to 2½ per cent., and the rate is fairly constant after ten years at between 1 and 1½ per cent. Under the proposed arrangement we would hope that the first couple of years would not stand out so prominently from their successors in the matter of withdrawals; but even if our anticipations on this score were not realised, the savings effected by the lower payments in these years would almost compensate for the higher payment made in the third year. The principle of postponed commissions is already in vogue with some Offices which defer payment of half the procuration allowance when the percentage premium is low; and I do not claim credit for originality even in the idea of applying the rule all round. I have not, however, seen these actual terms suggested before. In furtherance of our endeavours the *new business* returns might be so arranged as to spread the credit over two or three years instead of focussing the attention on the first year only. A plan like this would induce the outdoor workers to see that personal application was made for the premiums so long as their interests would be affected by the loss. When suggesting changes to add to the attractiveness of a policy we must not forget that every concession has its cost; but if it be admittedly desirable to discourage lapses, the benefits resulting by their avoidance would probably more than recoup the value of the concessions made. Were it thought necessary, however, the additional privileges could be

charged for—the magnitude of the premium is only a *factor* in competition.

I now wish to touch briefly upon a practice which is daily becoming more prevalent—I refer to the payment of indiscriminate commissions. Although it is difficult to treat a matter like this in a perfectly impartial manner, I am confident the remarks which follow will be taken in the spirit in which they are offered. There are various ingenious ways of offering such commissions, but so far as I have observed they resolve themselves into three principal methods:—

Firistly, public advertisement somewhat in the following strain :— "The best way to insure your life is to take an agency—write for particulars, etc." The quotation I have used certainly conveys the purport, and, unless my memory fails me, is the exact phraseology of an advertisement appearing in an Irish journal. It seems to savour pretty much of "Why pay medical men? Every man his own doctor for one shilling"; and I fancy the two advertisements would appeal to the same class of people.

Another Office issues a circular to all the gentlemen, for instance, who are honoured by the description of "Esquire" in the local directories. These worthy squires have it brought before them that if they are thinking of insuring their lives there is no occasion to give anyone the arrangement of a business which they can quite well carry out for themselves. The addressors will be prepared to allow various commuted commissions dependent on the amount of the policy. The gentle hint, moreover, is thrown out that "regularly appointed agents" receive a small abatement from *succeeding* premiums, and, if the party addressed is likely to be in a position to influence business, they will be prepared to receive an application for agency, etc. In other words, the first commission is thrown at the man and the renewal may be had for the asking.

The third method which has come under my notice is the issue of circulars by "Fire and Life" Offices to all policy-holders—whether Fire or Life—offering commissions.

In the stress of modern competition we should be slow to criticise any reasonably honest method of extending business, but the practices referred to above must, eventually, have a detrimental effect on agency systems generally. An agent is not over anxious that his client should know exactly what he makes on a transac-

tion, and if the business methods of different Offices are known to him he is likely to favour a Society retaining the old-fashioned plan of confidence rather than give his business to a Company which, perhaps only a month hence, will make a direct bid for his client's connection. We might draw the general conclusions that while these customs may temporarily inflate the new business returns, they at the same time have a bad effect on all *agency* systems, and the special Offices adopting them must be prepared to sacrifice their agents altogether.

In the course of our field work we frequently hear remarks to the effect that our Offices would be all the better of Government supervision, and a word on the subject may not be out of place here. At the present time the only duty entailed upon us is to deposit a Balance Sheet and Revenue Account annually with the Board of Trade, and periodically to make Returns to the same body showing the result of valuation of liabilities and the funds in hand to meet them. We can choose our own basis of valuation, but it must appear clearly from the Returns what basis *is* used. The Life Assurance Companies Act of 1870, in terms of which these Returns are made, although by no means a perfect enactment, has substantially fulfilled its objects. The welcome publicity of the Blue-books has witnessed enormous accretions of wealth, and at times an almost unnecessary display of funds, part of which might justly enough have been distributed as bonuses; and although we may sometimes be inclined to grumble at the delay of the Government Department in producing the Returns, we have had remarkably little to question in the subject matter when the preponderance of the interests is remembered. The spirit of the Act is "freedom of method" coupled with "publicity." In America, on the other hand, and in some of the Colonies, the Government dictates the principles on which the valuations are to be made, and has its own officials, who are supposed to ensure the carrying out of its requirements. No doubt there is much to be said in favour of supervision, but the great body of public opinion as represented by the leading actuaries on this side of the Atlantic is against it. Supervision is, of course, useless if it is not carried out by men of expert technical knowledge, but it would appear from information lately to hand from America that Supervisorships in that country have frequently been bestowed as a reward for political services rather than for efficiency. Apart from such considerations, however,

the case against Government interference has been summarised by Mr. George King, who makes the following points :—

(1) When the Government undertakes to examine Companies, the people begin to take things for granted and will not look out for themselves. (2) If the standard of solvency is not reached the defaulting Office is forced into immediate liquidation, even although it may not be actually insolvent. In such a case the "publicity" given by the Board of Trade returns could *discover* the weakness just as supervision would, but a remedy would in almost all cases be found by transfer to a stronger Company. This is surely a preferable alternative to liquidation. (3) The Government standard is apt to make the officers of a Company lose the sense of individual responsibility, and there is a tendency to be satisfied with the bare *essential* reserve funds. (4) The Government cannot refuse the licence to do business so long as a Company can show reserves up to standard. Publicity, on the other hand, would most likely discover the trend of things years before a Company actually fell short. (5) Where supervision has been practised it has shown itself *powerless* to prevent failures, and on this score it has certainly no superior claims to publicity; and (6) State control seems of little value unless accompanied by State guarantee.

"Class" assurance is largely an outcome of competition. Some Offices have a "Temperance" class and a "General" class. Mr. Moore's recent investigation seems to show conclusively that the abstainer has vitality superior to the average assured life, but it has still to be demonstrated that he is any better than the consistently sober man. Favourable experience may be an excellent argument for the abstainers of a Temperance Office desiring to be kept separate, but it has its counterpart in robbing the *general* section of a great portion of its very best blood. For assurance purposes there is supposed to be only one kind of "abstainer," but the *general* section will contain all sorts, from those who are practically teetotal to the veriest drunkards. Those in the upper reaches of the general section might not grumble about the extra mortality strain of the druukard provided they were backed up by the abstainers, but they have no such compensation, and would certainly get better value (*ceteris paribus*) from an Office with no such distinction.

Again, we see some other classes not necessarily abstainers being favoured with special terms. They include Civil Servants and

Ministers of the Gospel, Bank Clerks and Policemen, and, I have no doubt, many others. It would appear that some Offices are willing to allow special terms for almost any class of persons. It is difficult to find ground for defence of such a practice, except, perhaps, in the unusual case where it could be clearly shown that business, which it is desirable to cultivate, could be transacted at a lower expense than ordinary business, by means, for instance, of a saving secured through the collection of a great number of premiums at one source without issuing multitudinous renewal notices and receipts. In such a case an abatement to the extent of the saving so effected, *but no further*, might be justified. Unfortunately, however, special allowances go a great deal further than this, being frequently granted concurrently with full agency commission and the ordinary expenses attendant on the effecting of any policy. A concession for one man generally means an injustice to another; but apart from this, the whole idea seems to be objectionable. To begin with, it is a transgression of the recommendations of the Life Offices Association; then it lacks the true spirit of the "fair field and no favour"; it is difficult to distinguish from "rate cutting," and besides, in many instances it robs the agent of the chance of *ever* putting his Office's best value before his friends, for should a proposer belong to a "favoured" class he will deal with the Office directly, and if he has not that good fortune the very reason which opens the door for the agent's approach closes the inner chamber into which only the favoured few are admitted. The concessions made by different Offices vary considerably, and, furthermore, the fact of an arbitrary percentage of the premium forming the usual basis on which abatements are made results in unequal treatment to the individual insurers. The Offices making rebates presumably know their own business best, but some of us have still to learn where the profit comes from when the actual premiums paid, accumulated at 4 per cent. compound interest, or perhaps even at a higher rate, fall somewhat short of the amount payable at maturity, without having contributed a penny to expenses of management or claims occurring within the endowment period.

Although it does not directly bear on the kind of differentiation I have been dealing with, I would like to be permitted a cursory remark on the practice of keeping endowment assurances in a separate group for bonus purposes. In the past, policy-holders of this class have enjoyed a lighter mortality than others,

endowment contracts having been chosen by the people who believed themselves likely to live to receive their money. It is hardly probable, however, that this will continue so, at all events to any marked extent. It has been aptly said that from being the "option of the few" endowment assurances have become "the fashion of the many." These policies are yearly an increasing proportion of the total business, and bid fair shortly to practically monopolise our attention. The privilege of being an endowment man for bonus purposes will thus gradually become merely nominal.

A form of assurance which might be shortly discussed is the plan which anticipates future bonuses in the calculation of the premiums. Certainly it is a good thing to have a scheme which will give maximum cover at the lowest cost, but it seems undesirable when seeking this end to render it *even possible* for the sum assured to be reduced or the premium increased. No Office would venture on discounting a bonus higher than it fully expects to realise for, say, the next 25 years. If it should so happen that bad times ensue through an unforeseen fall in the rate of interest, or otherwise, necessitating a reduction in the bonus rate, the old policy-holders, the first patrons of the scheme, would find their policies decreased with each "division of the profits" at the very time they most required insurance. Besides, too, it is just conceivabe that to avoid such an unpleasant proceeding as this would be, we might strain a point to continue the anticipated bonus rate even although it were barely prudent (though financially possible) to do so. I mention this merely to show how our freedom of action might be hampered by the existence on the books of policies of the kind. What appeals to me as a better scheme is in operation in some Offices, where a fourth or a fifth of the ordinary full-profit life rate remains as a debt on the policy to be adjusted at each distribution by application of bonus. The value of the full bonus when declared is first applied to wipe out the debt which has accumulated in the meantime, and the balance of value is applied as a *permanent* reduction of future premiums. There is no departure here from the sacred principle of fixity of contract, and the plan has, above all things, the advantage of simplicity.

I will close my remarks with a note on insurance without medical examination, which is comparatively of recent growth and may be viewed as an outcome of competition. The different

schemes have been promulgated ostensibly to meet the cases of such persons as either have no time to be examined or have, on other grounds than those of health, objections to placing themselves under a doctor. Are there really many people who never have a spare half hour? I am inclined to think there are but few, and I fear the "conscientious objectors" are fewer still. I have seldom come across men who, believing themselves absolutely sound, are prepared to pay down a sum for the privilege of avoiding examination. That they must make some "equivalent grant" for escaping the medical ordeal is beyond question. They either have to accept a policy the nature of which in all probability does not meet their needs, or else they must be content with reduced cover during the early years in which they have, of course, to pay full premium. There may be some of the insuring public so constituted, but even of these who believe themselves sound, a portion will be unsound, for we all know that many of the most dreaded diseases cause but little inconvenience in their early stages; and further, that in many of these very troubles the final blow is but shortly removed from the first knowledge of the mischief. But others will be attracted who have a more or less indefinable foreboding that they are not in good form, and on that account have a desire for insurance. Such lives might have a good record as to immunity from personal troubles and family taint, and as far as I can see it is impossible to eliminate them except by examination. You may say that many such people are hypochondriacs, but all are not so, and examination would weed out the worst of them.

What I have described above as an "indefinable foreboding of trouble" would come up for consideration under the technical heading of "selection," and we cannot make too light of it. We have the strongest possible reasons for presuming that a man knows perfectly well what is best for himself. Mr. G. F. Hardy has shown that he who elects *ab initio* to take his bonuses in reversion is not so good a life as he who takes his profits in cash; and further, that the man who has taken cash bonuses in the past and changes to reversionary bonuses is worst of all. Again, the results of the recent investigations of the British Life Offices show that the death-rate is much heavier in the "Short Term" class than in the "Whole of Life" or "Endowment Assurance" class, and indicate the principle that mortality is highest where premium

is lowest. These are only a few instances of the law of selection against Offices, and we should be sanguine indeed did we anticipate that the non-medical scheme would prove an exception thereto. We cannot, in the face of overwhelming evidence to the contrary, afford to ignore the fact that an assurant *can* pretty well assess his prospects of longevity, and it is only to be expected that a non-medical scheme would attract to its fold just such lives as consider it "best value."

Besides admitting undesirables of the kind I have described, the scheme opens the door for fraud. I think we may take it that medical examination, on the contrary, if not an eliminant of *all* bad lives, bars most of them either by their own antecedent apprehensions or by the doctor's subsequent pronouncements. I see another objection to assurance without medical examination. Some of the best Offices have been able to keep their policy-holders more or less interested in their affairs, and their present strong positions, the result of consistently good management, are rewarded by a great volume of business being brought to them, directly or otherwise, by the efforts of these satisfied members. Such a marked departure from established principles (as non-examination might be considered) would probably be regarded as a speculative innovation, and might do more harm to such institutions than to those vigorous concerns which have not the great burden attaching to a reputation for conservatism.

We sometimes hear it stated that the higher price of a double endowment may really be looked upon as an extra charge to be put against excessive mortality. But we are wrong if we so regard it. It is a premium to secure the specific benefit of £100 payable *only* in the event of survivance. A popular idea exists that there is a gain on the pure endowment portion of the contract if the policy falls in before the maturity age, but when the premiums are computed on a scientific basis this so-called *profit* is on the average only the exact equivalent of the loss which would result on the same portion by the policy's emerging by survivance. If we were satisfied that the extra risk involved by non-examination were in the nature of a mortality only slightly higher than the average in the early years, and rapidly increasing, there would be some ground for accepting proposals under the plan, but Mr. John Nicoll has dealt very fully with the subject in a paper recently read to the Faculty of Actuaries, and his conclusion, which was endorsed by those who joined in the

discussion following, was that *the extra risk is heaviest in the early years.* Mr. Abraham Levine has shown that this is the very case where there is the least justification for granting a double endowment at ordinary rates in order to get over the extra premium which would otherwise be charged.

I have observed that some Offices refuse to recognise assignments under this table during the first few years, and this seems to point to its suitability for speculative third parties were it not so protected. I would sum up my views of assurance without medical examination by humbly expressing the opinion that the reasons which *suggest the propriety* of hedging round a scheme, minimising loss by early death and prohibiting speculation, *indicate the prudence* of avoiding it altogether.

THE ASSURANCE OF UNDER-AVERAGE LIVES.

By WILLIAM HUGHES, F.I.A.

A Paper read before the Insurance Institute of Yorkshire, 20th February, 1906.

In his address at the opening of the Session of your Institute, 1901, your President, Mr. Wootton, referred incidentally to some of the disappointments and reverses experienced by workers in the field of life assurance through declined or not completed proposals. "An old hand at the work," he said, "becomes hardened to such reverses, and learns to anticipate them from time to time. They are inevitable, and probably if we did not experience them we should not so fully appreciate success when it comes, neither should we find our work so interesting." These experiences are, however, none the less irritating, and however hardened the old hand may be, he cannot but feel something like exasperation when he receives the official letter announcing the rejection or rating-up of a proposal on what he considers an unexceptionable life, and which has been secured by him after perhaps months of hard work. At such a time he may even be tempted to doubt the wisdom of the directors and chief office officials, a matter on which, of course, he ordinarily has no kind of misgiving. The effect on a young agent may be even more serious, for if he should meet with two or three such cases at the opening of his career, it may result in his throwing up his agency and transferring his energies to some other sphere of work. No doubt there are many cases in which the result is not altogether unexpected, but, on the other hand, there are many in which the decision of the chief office is quite unanticipated and inexplicable by the agent, who thinks there must be "some mistake," or, at all events, that the officials at head-quarters are too cautious and suspicious. The fact is, of course, that these officials look at the matter from a different standpoint. While they are quite as anxious as the agents and other outside

workers to secure a large amount of new business, the directors and managers are influenced by other considerations which do not come under the immediate attention of those who are almost exclusively concerned in the quest of it. It is the care of the management to see, among other things, that the business is conducted at an adequate profit, for unless this is done bonuses will be diminished, and the prestige of the office will suffer. The rate of mortality among the lives assured has, of course, a most important effect upon the rate of profit, and the office is therefore under the necessity of seeing that the risks it undertakes are properly selected, that in doubtful cases the premiums charged are duly adjusted to the estimated risks, and that altogether unsuitable proposals, or even those of a very doubtful character, are absolutely excluded. These considerations are, of course, tolerably obvious, and will be readily admitted by all who have given any thought to the subject; but their full force can only be appreciated by those who are engaged in the actual management of a central office, and it is one of the great advantages of the establishment of provincial Insurance Institutes that they afford opportunity to actuaries and other chief office officials of drawing the attention of agents and other provincial workers by papers like the present to some aspects of the business of life assurance which do not occur to them in the conduct of their daily work. When on a former occasion I had the privilege of addressing a provincial Institute, it was a great satisfaction to find that I had been able to present the chief office view of certain matters in such a way that more than one agent afterwards thanked me for having explained some points which had always perplexed them, and said that they "had never seen them in that light before." The paper to which I refer was read before the Insurance Institute of Newcastle-on-Tyne, and deals with the general question of the selection of lives for assurance. I had intended in that paper to have considered at some length the question of under-average lives, but my space was exhausted in the discussion of the principles and methods of selection generally, and I was only able to make the briefest reference to this part of the subject. I have to thank you for giving me the opportunity, by your kind invitation, of now going more fully into it.

The expression *under-average lives* is not, perhaps, an altogether satisfactory one, but it is not easy to suggest a perfectly satisfactory alternative. Lives involving more than ordinary risk are

sometimes described as impaired, deteriorated, invalid, or diseased, but none of these terms is sufficiently general. I have adopted the expression "under-average" in the title of this paper as being convenient and generally understood; but I think the term "sub-standard" more nearly expresses the kind of life we are considering, and in the course of this paper I shall use it in preference to "under-average."

Before we can properly discuss sub-standard lives, it is necessary to have some idea of what is meant by a standard life—in other words, a life assurable at ordinary rates. If life assurance were made legally compulsory, and a law were rigidly enforced that every person must at a given age, say eighteen or twenty, effect and maintain a policy for a certain limited sum, it would become unnecessary to attempt any classification of lives. All could be accepted—healthy and unhealthy alike, even including persons actually at the point of death—at a premium not very greatly different from that now charged by the Companies on their carefully selected lives. This may appear somewhat startling at first sight, for it would naturally seem that the carefully selected should be able to obtain very much better terms than the mixed crowd. But it must be recollected that, as it is, the Offices cannot secure all the good lives, and in the absence of selection would be quite certain to attract nearly all the worst. Moreover, many of the good lives would defer application for insurance until the last moment, and would only enter when they had become what under the existing practice is hopelessly uninsurable.

Assurance Companies, therefore, are compelled to adopt a system of selection, not so much with a view of securing only lives of an actually superior quality, as of excluding those that are manifestly unsuitable, and of accepting only on modified terms those that are in any way defective. The standard, therefore, is rather of a negative character. If the medical examiner can detect no imperfection or weakness in any of the physical organs of a proposer; if there is no history of any past illness which has, or may be suspected to have, impaired his constitution; if there is no suspicion of intemperance or irregularity in his mode of life; if his family history is satisfactory; if his occupation is not of a dangerous character; and if his residence and surroundings are not insanitary—in short, if no unfavourable circumstance is apparent or suspected, the life may be considered a standard life, and will be admitted for assurance at the standard rates of

premium. Any proposer who does not come up to or very closely approach this standard can only be admitted on special terms, if at all. In thus stating what may be considered a normal or standard life I have indicated the principal circumstances which make a life sub-standard or under-average. The most obvious of these is, of course, the existence of actual disease. If there should be permanent disease of any of the principal organs of the body a medical examiner will almost always advise the actual rejection of the life altogether. The malady may, however, be of a kind which, though permanent and incurable, is not of a nature to necessarily indicate a speedy fatal result; and in such cases a medical examiner may suggest acceptance at a considerable increase of premium. In certain kinds of heart disease, for example, a sufferer may live even to an advanced age if he is aware of his condition and is careful to avoid undue exertion or excitement tending to increase the force of the malady; but it is evident that any such case involves a high degree of risk, and the office will usually prefer to decline it, notwithstanding the recommendation of the examiner. In cases of disease of a less degree of gravity, and when there is hope of a complete cure, the consideration of the proposal may be deferred until recovery has taken place, and some definite opinion may be formed as to whether the malady has left any evil consequences of a permanent kind. Many of the cases of declined proposals which perplex the agent are those in which the medical examiner has discovered or suspects the existence of grave defect or disease in an apparently healthy subject. The agent has forwarded the proposal to head-quarters never doubting of the soundness of the life, and even the proposer himself is perhaps altogether unconscious of the existence of the defect which the examiner has detected. Such a life may even subsequently obtain admission to another Office whose examiner may be less skilful or more optimistic, in which case, of course, the perplexity of the agent is very naturally increased.

One of the most usual reasons for placing a life in the sub-standard class is the existence of consumption in the family history. The subject of the alleged heredity of consumption, and the nature of the disease itself, have, as you are aware, received a great deal of attention lately from the medical profession, and old opinions have been greatly modified. It is now, I believe, the opinion of many of the most competent physiologists and physicians that this formidable disease is controllable, and some have

even gone so far as to assert that it will have practically disappeared before the end of the first quarter of the present century. It is now said to be of an infectious character, and not hereditary, and that its undoubted prevalence in certain families arises not from constitutional similarity, but from the inevitable physical proximity of members of the same family. If a proposer has had the misfortune to lose either parent or a brother or sister by consumption, it has hitherto been the almost universal practice to consider the mere fact a complete bar to giving him a place among normal lives, and to decline any enquiry as to any circumstances attendant on the cases of the relatives which might possibly affect our opinion of its consequences upon himself. If all that is asserted by the more sanguine investigators of this matter could be regarded as indisputably proved, the practice of Life Assurance Companies in regard to it would have to undergo very considerable modification, and I know that many life assurance agents have very eagerly looked for an announcement from headquarters that the existence of consumption in the family history would henceforth cease to be regarded as a bar to the acceptance of a proposal at ordinary rates. But we have not got quite so far yet, if, indeed, we ever shall. For although opinions have modified, and much of the new doctrine has been unreservedly accepted, the extreme optimistic view is far from being universally entertained. Meanwhile, it would be in the highest degree unwise for Life Assurance Offices to abandon their old practice or even to modify it to any considerable extent, though there is now a reasonable disposition to consider circumstances in individual cases which would not have been considered in former times. Even if it is conceded that the disease itself is not hereditary in the fullest sense, a certain considerable degree of susceptibility to infection may exist in families. It is a matter of common observation that personal characteristics, not only of form and feature but of general constitution, are transmitted from parents to children, even through many generations. It is also well known that there are some forms of general constitution that are particularly susceptible to infection of *any* kind, and it is not unreasonable to suspect that this susceptibility is itself transmissible, and is, in fact, usually transmitted. Although a man may not actually inherit the consumption of which his mother died, he doubtless has inherited in some degree her general constitution, and if she fell a victim to consumption, possibly acquired by infection, so he

is more likely to acquire it if he should be placed in circumstances favourable to infection than if he had not inherited the susceptibility which his mother may reasonably be supposed to have possessed. This view of the matter is supported by the very high authority of Sir J. Crichton Browne, who, at a meeting of the Sanitary Institute two years ago, said :—"That pulmonary con- "sumption is no longer to be considered as an hereditary disease. "I regard as a somewhat dangerous doctrine. In connection with "tuberculosis, we have not only to consider the seed, but the soil, "and it is undoubtedly true there are certain kinds of human soil "which are peculiarly favourable for the reception of the tubercle "bacillus, so that there is a tuberculosis in the temperament in "the nature of certain classes of people who are rendered pecu- "liarly liable to contract the disease. It is a matter of common "knowledge that the disease does run in families, and often in "families widely scattered from each other, and I think we ought "not to banish the idea that there is a certain amount of heredity "in connection with it." We cannot, therefore, expect that the Offices will abandon the practice of deeming all lives with consumptive family history as sub-standard, though they may be disposed to look upon them somewhat more leniently than formerly.

It is popularly supposed that after the age of fifty all danger of death by consumption disappears, but this idea is not altogether correct. Deaths by this disease occur at much more advanced ages, but it is no doubt true that the probability of the occurrence rapidly diminishes after the age of forty-five, and if the life is otherwise unexceptionable the Office will usually disregard the fact of a single case of consumption in the family history of a proposer who has attained the age of fifty.

Although consumption is the principal malady which we are accustomed to take into account when considering the family history of a proposer, it is not the only one. We not unfrequently meet with cases where many of the members of the same family have died of the same disease, and this of a kind not usually regarded as hereditary, and we may reasonably infer that there is something in the family constitution predisposing to liability to that particular kind of malady; and though this circumstance may not in itself justify us in regarding the life proposed as sub-standard, it will have weight if considered with any other circumstances of a doubtful character. A history of insanity or suicide by a parent suggests the desirability of enquiries as to details, and

if the proposer appears to be a person of melancholy disposition, or if his circumstances or occupation involve severe mental work and responsibility, or if there is any indication of worry or possible financial or other anxieties, we may be justified in placing such an applicant in the sub-standard class.

The question of personal habits, especially in the matter of temperance, is of course of the highest importance in estimating the risk. Thanks to the great improvement in our social habits at the present time, when compared with those of fifty or even twenty years ago, in the great majority of cases that come under our consideration this question does not arise. In a very few others undoubted evidence of actual intemperance leaves no room for hesitation, and the proposal is at once declined. There remain those cases in which either there is some doubt as to the facts, or the facts being fairly clear, there is room for some difference of opinion as to their weight and significance. It is not always easy to obtain very precise information as to habits, and in fact a good many persons who are not all that could be desired in such matters succeed in obtaining admittance to the ranks of the assured at ordinary rates. The medical examiner cannot do anything to protect the Office when the applicant's careless, or usually intemperate, habits have not as yet left their mark on his physical condition. The applicant's own statements are, of course, of a satisfactory nature, for no man ever admits that his habits are anything but satisfactory. The agent is as ignorant of the true facts as the doctor, and the private referees will not always say enough to put us on our guard. The slightest indication of irregularity calls for careful consideration and enquiry, and it is the referees who often do give us such an indication, which followed up may lead to important discovery. It is sometimes thought that these private reports are of little value, because a man's friends will always do the best for him, and are not disposed, to use a colloquial expression, "to give him away." This is quite true; but I have found by experience that if instead of giving a simple "yes" in answer to the question "is proposer temperate?" the reply is wrapped up in any such phrase as "I think so," or "I never saw him otherwise," or "a moderate man," "not a teetotaller," it will often—I may say usually—be found on further enquiry that the proposer is in the habit of exceeding the bounds of strict temperance, even though he may never in his life have been in a state of intoxication. In cases like these it is so difficult to arrive

at an accurate knowledge of the facts that it is usual to decline such a proposal absolutely. Even when we can arrive at a definite opinion as to the facts, and it appears that the proposer, though by no means intemperate, is what is called a free liver, or perhaps only occasionally goes beyond the line of strict temperance, as at market dinners, or social festivities, these facts most certainly imply a considerable amount of extra risk, and if such a case is accepted at all, it ought to be only at a very substantial addition to the ordinary rate of premium.

Another circumstance which leads us to regard a life as sub-standard is any marked excess or defect in weight. It is well known that very light weight is often associated with a tendency to consumption, especially among the young; and on the other hand, that men of great weight are more than ordinarily likely to become the subjects of apoplexy or heart disease. It is evident, too, that the danger of ill effects from certain kinds of accident is greater in the case of very heavy men, and a plethoric habit lessens the chance of making a good recovery from some kinds of diseases. For the purposes of comparison, a table constructed by Mr. Hutchinson may be, and I think is, generally used. This table gives the weight of a healthy man of thirty years of age, 5ft. 3in. in height, as 9st. 7lb., or 133lb.; and for a man of 6ft., the weight is 178lb., or 12-st. 10lb., and in about the same proportions for intermediate heights. Roughly it may be stated at 2½-lb. for each inch of height for men between 5ft. 4in. and 6ft. 2in. For women it will be a little less. For every year of age up to 60 an addition of ¾lb. should be made. A very considerable margin on either side of this standard may be allowed, perhaps as much as twenty per cent., but beyond that margin the life should undoubtedly be regarded as sub-standard. It is not always stated on the examiner's report whether the weight has been actually ascertained by the use of a weighing machine, whether any allowance has been made for clothing, whether the stated weight is merely an estimate by the doctor, or whether it is simply the proposer's own statement. In the last case it is very likely to be inaccurate; not many men know their weight accurately, and in the case of heavy men there is often a considerable risk of over-statement. Heavy men are very often proud of their weight, probably from a notion that it is an indication of robustness, and are quite unconscious that beyond a certain point its indication is in quite a contrary direction. It may be noted,

too, that there are parts of the country where the average weight is probably greater than for the country generally, as, for example, the northern counties of England, and some parts of Yorkshire, and of Scotland.

So far we have been considering the circumstances that place a life in the sub-standard class, and we have seen that it is generally possible to determine when in any given case the proposer must be so regarded. It is a much more difficult task to determine the degree of deterioration or departure from the normal in any individual case. It is usual to consider that the extent of this departure may be expressed by saying that the deteriorated life is equal in value to a normal life of greater age. Probably for practical purposes this assumption is fairly sufficient, as it certainly is convenient, but it does not in all cases accurately represent the actual conditions, for the nature of the impairment may be such that the additional risk may be immediate and large, with a tendency to diminish or even disappear with advancing age; or, on the other hand, the additional risk is to be looked for only in the later years of life. Let us consider the age of a person aged twenty-five who is reported by the medical examiner as so far impaired that he recommends that ten years be added to his age, or, in other words, may be properly accepted at the normal premium for age thirty-five. The treatment of the case in this manner is accurately applicable only on the assumption that the probability of death during the first and every successive year after entry is equal to that of a person ten years older, whereas the actual physical condition and history may point to no immediate increased probability of death, but to a considerably increased probability at a later date, say between ages fifty and sixty if the subject should live to attain the younger of those ages. On the other hand, if the assured, though healthy, is of delicate appearance, and with history of consumption in his family, the probability of dying between ages, say, twenty-eight and thirty-three may be considered as much in excess of that of a normal life now aged thirty-five dying between thirty-eight and forty-three; and if he should survive to attain fifty the extra risk will have practically disappeared, and he will then probably rank among those who entered as normal lives at age twenty-five. In some other, but comparatively rare cases, the extra risk is to be anticipated neither immediately nor in advanced age, but at the middle period of life. It might perhaps seem that these conditions might be met by providing

in the contract or policy that an additional premium should be chargeable during the years of estimated extra risk; but apart from the fact that it would be almost impossible to get any proposer to accept any such policy, a contract of this kind would be contrary to the general notion of insurance. Policies starting at a low premium, increasing to a defined maximum after a few years, and policies with similarly decreasing premiums, are not unknown; but contracts providing for premiums varying from time to time during the currency of assurance would be altogether unmanageable, as they would be subject to the exercise of an option on the part of the assured dependent upon the circumstances of his health, or his opinion of his health, at the time when the increased premium became payable. If he then happened to be in decidedly bad health the assured would, of course, pay the increased premium and keep the Office on the risk, but if his condition had manifestly improved he would seek, and probably obtain, admission as a new applicant at the normal rate for his then age, which might be considerably less than the increased premium provided for in the existing policy.

Practically there are but two methods of dealing with sub-standard lives: either by permanently increasing the premium, or by charging a premium largely increased for the early years of assurance, diminishing yearly for a defined term until the normal rate for the age at entry is reached. This latter usually takes the form of a policy at the normal rate with a considerable deduction from the sum assured in the event of death during the first year, which deduction is itself reduced annually until it disappears. This system has been found to be very popular, because there are not many people who contemplate the probability of their own early death, and those who do so are usually pessimists who are gloomily glad to get assured on any terms. The amount of the deduction in any individual case is fixed by the actuary and chief medical officer on principles derived from experience and actuarial science, and is not expressed in terms of addition to the age.

Another method sometimes adopted is by withholding the bonus if the life should drop within the term of normal "expectation of life." This is open to the very obvious objection that it is applicable only to "with-profit" policies; and it is also objectionable because it fails to discriminate between different degrees of deterioration, and treats alike all entrants of the same age that for any reason are not considered first-class. In many of the forms

of medical report supplied by the Offices to the examining doctor he is requested to state his opinion whether the life should be accepted at ordinary rates, or, if not, what number of years should be added to the life. With the greatest possible respect to the medical profession, and to the able framers of these forms of report, I do not think this is a question that ought to be put to the medical examiner. As I have already said, the addition of years does not always properly represent the true conditions, and even in those cases in which it may actually be appropriate, I do not think the examining doctor should be called upon to make any such estimate. It is not every practitioner that has given any close attention to the subject, and I think that most of those who have done so would acknowledge how difficult it is to arrive at any definite opinion about it. The vast number of medical men throughout the country who are daily making reports to Life Assurance Companies vary, of course, in attainments and temperament, and consequently make widely different answers to this particular enquiry in cases where the facts are substantially identical, or even with regard to the very same life. The Office is dependent, of course, upon the examiner as to the facts of each particular case; he, only, can tell us if the proposer's organs are sound, or, if otherwise, in what manner and to what extent they are impaired; he will also be able to state his opinion generally as to the constitution and physical condition of the proposer, and to mention anything in the appearance or demeanour of the applicant which may have affected his opinion, and he can also add any specific remarks that he thinks may assist the principal medical officer in forming his estimate. The principal medical officer is, of course, an expert in such matters: all the reports of the examiners pass through his hands, and he is in constant contact with the actuary, and it is for him alone, or in consultation with the actuary on the facts and opinions submitted by the examiner, to decide upon the number of years to be added to the life. In short, the examiner's function is to report facts, supplemented by a strictly medical opinion; the principal medical officer, as a specialist, considers and reports on these facts, and the examiner's opinion; and it is for the actuary, and for him alone, guided by the reports so submitted to him, to determine what rate of premium is appropriate to the risk.

In the case of an endowment assurance, the sum assured being payable either at the expiration of a limited term or at previous

death, if the life appears to be sub-standard only on account of apprehended additional risk in advanced age, it is unnecessary to require an increased premium. If, on the other hand, the additional risk should appear to be immediate and considerable, the applicant cannot be accepted at ordinary rates, but the assurance can usually be granted on more favourable terms than if the application were for an assurance extending over the whole of life. The premium for an endowment assurance consists of two parts, one being for the temporary assurance for the term, the other for the payment on survival. Any circumstance which tends to increase the probability of early death demands an increase in the first of these parts of the premium; but as the *increased* probability of death is of course identical with *decreased* probability of survival, the second part of the premium is diminished. If these two variations in the component parts of the premium exactly balanced one another, the deteriorated life might be accepted at ordinary rates for an endowment assurance; but as with increased risk the term part of the premium increases faster than the endowment part diminishes, an impaired life can only be taken at increased rates even for an endowment assurance.

The business of life assurance at the present day is in many respects very different from what it was when it was first practised, or indeed from what it was but a comparatively short time ago. At first it was a mere guarantee for a single year that the assured would not die within the time; but it almost immediately became an assurance of a definite sum at death, in consideration of a fixed annual premium during life. Not long afterwards, when it was found that the premiums contracted for were much in excess of what was required to meet the risk and expenses, and that large profits were being made, the practice was adopted of distributing the profits, wholly or partly, among the assured. No doubt the popularity of life assurance was thus greatly enhanced, enabling the Companies to hold out the hope of large, though indefinite, additions to the sums assured, and thus to compete among themselves much more effectively than would have been possible if premiums were kept closely approximate to the actual cost of the risk. So far this was at all events *life assurance* pure and simple, and depended upon its success very largely on the careful selection of the risks by medical examination. When, however, the idea arose of combining investment for survivors with assurance for payments at death by means of endowment assurances and other

expedients, the question of medical selection became, as we have seen, of less importance. At first, endowment assurances were granted by the Companies payable only at comparatively advanced ages, seldom before sixty, and the necessity for medical selection was very little less than in the case of assurances for the whole life. As the idea of investment combined with life assurance became more familiar to the public, a demand arose for shorter and yet shorter terms, with the result that many endowment assurance policies now issued are of such a kind that no more than a quarter of the premium is in respect of the death risk; and where, as in some cases, the payment on survival is double of the payment at death, the portion of the premium attributable to the risk is so small that medical examination has been dispensed with altogether, the Offices relying for protection against the worst class of life on the proposer's own declaration, and the report of their agent or other local non-medical official. For this class of transaction a life known to be not quite up to standard may usually be admitted; but if there appears to be any serious flaw in the health, or extraordinary hazard in the occupation or surroundings, the proposal must be declined altogether, for in contracts of this kind there is no such course possible as "rating up" or accepting on special terms. Life assurance without medical examination is a very attractive offer to those nervous people who dread the ordeal of going before the doctor, but in the cases in which the offer is made it will be found that the life assurance element in the contract is a very small part of it—as in the so-called double endowment policies—or that the full benefit is deferred for a not inconsiderable time, only a small part of the sum nominally assured being payable in the event of early death. You have probably met with cases when a man having taken a policy of this kind has afterwards, on considering the terms of his policy, expressed considerable dissatisfaction, and has perhaps eagerly accepted a suggestion that he should after all submit to examination with a view of being at once put in full benefit if the report should be satisfactory.

Several Insurance Companies have made an investigation of the mortality experience of their rated-up lives, but these have in most cases been confined to the financial effects and to the actual mortality among impaired lives generally. It seems to me that conclusions of a general character derived from the examination of the mortality experienced among rated-up lives must necessarily

be defective, because the lives have been rated up on the recommendation of numerous different examiners and officials, some lenient and others severe, some with prejudices leading them to suspect the existence of serious disease in nearly every applicant, and some unwilling to see any defects or to attach importance to conditions which would by many others be regarded with grave suspicion. Moreover, the lives that are absolutely declined do not come under observation at all; others that are heavily rated up do not complete their policies; and others, again, discontinue their assurance after a few years, many of them, doubtless, because their condition has improved to an extent admitting of their effecting new policies at ordinary rates. If we could obtain a sufficient number of lives, all examined by the same doctor, accepted or rejected on definite and stated principles, and if we could follow every one of them, including the declined and discontinued, until death, we might obtain a set of facts on which we could base some valuable theories.

Application is sometimes made by persons who have been accepted at an increased rate of premium (but who have lived for many years in apparently good health) for a reduction to the normal rate for the age at which they entered, on the ground that facts have demonstrated that the original estimate was erroneous. The fallacy in this argument is so apparent that it would seem almost unnecessary to refer to it; but applications of the kind are so often made by assured persons, and supported by agents on their behalf, that it is worth while to point out that the rate of premiums for an assurance of any kind must be based on the best estimate of risk that can be made at the outset, and cannot be altered or affected by any subsequent event, whether favourable or unfavourable. The fact that a man who in his youth appeared to be what is known as delicate, and a not unlikely subject for consumption, has lived to middle age or later, and is now in robust health, is no proof that the estimate of probabilities in his youth were erroneous. The argument is as unsound as it would be to say that because a man has come out of a fierce battle without a scratch, or has returned in perfect health after a long residence in a deadly climate, there was no danger in facing the enemy or the miasma. Moreover, if such an argument was sound it ought to apply to the converse conditions, and it would be equally reasonable in the case of the early death of a person assured at ordinary rates if the directors of an Assurance Office were to say that the event proved that they were mistaken in their estimate

of the risk, and were accordingly entitled to refuse payment of the claim, or at least to make a deduction from the amount assured to compensate for their error in judgment in having failed to charge an increased premium.

In the course of my official experience I have frequently received letters from agents requesting, sometimes almost imploring, the Office to consider its decision upon a declined or surcharged proposal. I remember one in which an agent expressed actual terror :—"I dare not tell Mr. A. his proposal is declined : he will consider himself insulted, and I do not know what the consequences may be." For the comfort of such agents, and such proposers, it may be pointed out that many persons who have been rejected by Life Offices have lived to quite advanced ages ; and in the case of a life being classed as sub-standard it should be remembered that not only may the estimate of the Office be mistaken, but even if it is well founded, and perhaps based on very obvious circumstances, it does not follow that the proposer must necessarily contemplate an early close of his career. The fact that a man has been warned by an unfavourable opinion by an Assurance Company that there is at least some doubt of his physical condition, has often led him to make independent enquiry for himself, with the satisfactory result that his confidence has been completely restored by the discovery that the suspected flaw is of a kind involving no immediate or serious danger if he will only take certain definite precautions, and avoid exposing himself to risks which the robust often think they may safely incur. The old proverb which says that "a creaking door hangs long on its hinges" receives abundant illustration in the numerous cases of confirmed invalids who live to old age; and the number of persons now living who have been rejected or heavily rated up many years ago by Assurance Companies may no doubt be reckoned by thousands.

Referring, in conclusion, to the subject with which I started, the disappointment of agents in connection with rated-up and declined lives, I venture to hope that this paper may at least afford a hint or two that may tend to lessen such disappointment, by suggesting, to the less experienced at all events, a line of preliminary enquiry as to certain particulars, which may save the expenditure of much time and energy on unlikely cases. It may also, I hope, serve to remove the idea sometimes entertained that officials at headquarters are unduly cautious or suspicious, and insufficiently mindful of the interests of those provincial representatives to whose exertions they are so largely indebted for the prosperity of their Companies.

DEVELOPMENTS OF ACCIDENT INSURANCE.

By J. CORBET M'BRIDE.

A Paper read before the Insurance Association of Manchester, 7th February, 1906.

The developments of Accident Insurance during the past sixty years, both in the nature and extent of the risk covered, are greater than those of any other branch of insurance business. While the first Company was created to cover one risk only—the limited risk of railway travelling—it may be said that a modern Office is prepared to indemnify the public in respect of a multitude of diverse contingencies; in fact, all brances of insurance, other than marine, fire, and life, are within the scope of Accident Insurance as we know it to-day. It is impossible in the short time at our disposal this evening to do full justice to the subject of this paper, and it must suffice to briefly review the more striking developments which the business has undergone.

It is on record that centuries before Accident Insurance, as we now know it, was contemplated, a crude form of compensation for injuries was in vogue, for we read in the "Ancient Sea Laws of Wisby," under date 1541, that it was incumbent upon the owners of ships to insure the lives of the masters against the perils of the sea. Again, in 1665, at the time of the war between England and the United Netherlands, the Republic issued a proclamation announcing that compensation would be awarded to soldiers engaged in the service of their country. This proclamation promised certain lump sums for specified injuries—so much for the loss of two eyes, one eye, two arms, one arm, and so on, and other provisions were made for those who suffered less definite injuries. This system of compensation curiously forecasts one of the present-day systems of personal accident insurance. Modern accident insurance owes its origin to the fear of accidents consequent upon the intoduction of railway travelling. With the

year 1845, memorable in the history of railway enterprise, our record begins. In 1848 the Universal Railway Casualty Compensation Company was registered, but fortunately at the first meeting of its proprietors it was decided to adopt the more convenient title of the Railway Passengers' Assurance Company. Its operations extended only to insurance against railway accidents, fatal and non-fatal. The Company defined a railway accident as "an accident happening to a train whilst in motion," a definition which made no provision for trains run into by other trains whilst themselves standing still. The risk was covered by the issue of special tickets to passengers. The heavy duty then levied on insurance contracts would have effectually prevented the issue of such tickets at the cost of a few pence, and a bill was promoted in Parliament by which it was arranged that the Government duty should be assessed on the gross receipts. Fears were entertained that the temptation offered by this system of insurance to "unscrupulous" mothers to exchange "superfluous" children for large sums of money might prove too great; a clause was accordingly inserted in the bill that no ticket was to be issued to any child under twelve years of age, and this restriction is still in operation. A fixed sum was payable for fatal accidents, whilst for non-fatal injuries provision was made in the following terms:—"A reasonable compensation for such injury, as well as for the pain of mind and body and the loss of time and money consequent thereon." The public and the Insurance Company held widely divergent opinions as to what constituted "reasonable and liberal compensation"—in this respect human nature was much the same in those days as it is now.

It was not until 1855 that the railway passengers obtained the requisite Parliamentary powers to insurance against accidents of all kinds. In the meantime, on the 24th January, 1850, the Accidental Death Insurance Company was registered. The original object of its promoters was to insure against fatal accidents from all causes, but it was subsequently decided to extend the operations to insuring "compensation for bodily injury occurring to any person or persons from accidental or violent causes, or causes not occasioning death." From this provision of compensation for non-fatal injury dates the modern system of personal accident insurance. The original prospectus admirably advocates the necessity for insurance in these words:—"The numerous casualties to which the life of man is liable are subjects of daily occurrence

and observation. There is scarcely an individual who cannot refer, within the sphere of his own family or acquaintance, to instances of sudden or accidental death, and few who cannot look back to their own providential escape from imminent danger. To guard against the consequences of such a calamity, whether happening in the pursuit of business or of pleasure, is the duty of everyone, and this Company will afford to all, according to their circumstances, the means of obtaining so desirable an object." The present-day prospectuses contain many specious arguments advocating the value of insurance in general, and the claims of their own Office in particlular, but none have improved upon the arguments as set forth in the original prospectus of the Accidental Death Insurance Company.

In the absence of any tabulated experience the difficulties of obtaining reliable data on which to base the rates of premium were great. To cover railway accidents only to the extent of £1000 at death and £5 per week during disablement the premium was fixed at 10s. For persons not exposed to any special risk from their occupation the premium to cover fatal accidents of all descriptions was £1. For £1000 insurance and to provide £5 per week during entire disablement a premium of £3 10s. was charged.

The policy also included a sum not exceeding £10 for medical attendance during the injury. The scheme for allowing medical expenses was based upon the idea that efficient medical attendance would lead to speedy recovery from the injuries sustained, but in practice the opposite result often obtained. In cases of slight injury, medical men of a certain type kept the patient on the funds of the Company until the allowance for medical expenses was exhausted, and in consequence the Company had to pay the claimant £5 a week whilst the doctor was working up his bill to the £10 limit. After a trial the payment of medical expenses was abandoned.

In 1856 the Norwich and London Accident and Plate Glass Insurance Company was founded. It offered no specially new features, but in assessing its premiums discriminated between normal risks and those of a more hazardous nature.

The year 1857 was an important year in the history of Accident Insurance. The business was new, and the managers had not learnt to fence it round with those restrictions which, in the light of later experience, were considered necessary. The Offices were found to be peculiarly open to imposition and fraud. It was in this

year that a father and son was drowned, in circumstances which left little doubt that the son had deliberately driven his father into a deep river where there was no prospect of help to hand. Unfortunately for the would-be parricide, the father clung to him, and both were drowned. Both were heavily insured, but it transpired that a few weeks previously the father had been an inmate of a workhouse. In the same year a miller effected two policies of £2000 each, under two designations, through two different agents in the same Company, and was afterwards found dead in his own mill-stream. Henceforth, conditions were introduced into the policies, and regulations adopted in the conduct of the business to secure the Offices from fraud. This year saw the first serious attempt to place on an actuarial basis the varying risk of accident involved in different occupations. It was found that for many occupations the premiums charged by the Companies were too low, and that some risks were undesirable at any rate of premium. The result of the investigation was to classify the various occupations under five degrees of risk. By a broader classification of risk these divisions have now been reduced to three.

It is interesting to note that in the year 1863 personal accident insurance was first introduced into the United States by the formation of the Travellers Insurance Company of Hartford. This Company has been carried on with success ever since.

In the year 1868 we find the first reference to a return of any portion of the premium to the policy-holder. Such return was, in the first place, largely dependent on the profits, but now policy-holders are allowed bonus reductions—after a certain period of insurance—whether the Company makes a profit or not.

About this time a new feature was adopted by the Insurance Companies by which, instead of an allowance at a fixed rate per week, a specific amount was paid to the policy-holder in the event of a specific injury. Assuming the policy to be for £1000 for a compound fracture of the arm, the insured received £65; for a compound fracture of the thigh £80, and so on. This scheme bears a striking resemblance to the proclamation which we have referred to, issued by the Netherlands Republic in 1665. It was thought by the Accident Insurance Companies that this scheme would prevent exorbitant claims. In practice, however, it has been found that payment of a specific sum in the event of a specific injury is only satisfactory to the insured so long as he recovers within a period less than the expectation for the injury in question.

Where this expectation is exceeded the insured feels aggrieved, and regrets that he had not elected to insure under a schemé allowing a stated sum per week during the whole period of disablement.

So far we have been considering the early aspects of personal accident insurance during the period in which the Accident Offices confined their operations entirely to this one class of business. It now becomes necessary to consider other contingencies underwritten by the Accident Offices.

In the year 1869 the London Guarantee and Accident Company was founded. It was the first Office to combine the business of personal accident insurance with that of any other class; as the name of the Company implies, one of its two objects was the issue of fidelity guarantee bonds. This Company was not, however, the first to transact fidelity guarantee business, for so long ago as 1840 the Guarantee Society of London was established for this purpose. Previous to 1840 fidelity guarantees could only be obtained through the medium of private sureties, who had to run the risk of pecuniary loss to which all persons are exposed who become liable for the acts of others. It is now the universal custom in all departments of commercial life to accept an Insurance Company's bond in preference to a private guarantee. The security of the employer is absolute, whilst he has the comfort of knowing that the character of the person whom he is employing has been thoroughly investigated by the Insurance Company before the bond has been issued. It is also the practice of the various Divisions of the High Courts of Justice, and all departments of His Majesty's Government, to accept the bonds of Insurance Companies. Fidelity guarantee business is now a recognised branch of accident insurance business, and is transacted by the bulk of the Companies.

The first Company to transact plate-glass insurance appears to have been founded in 1852. During the next few years it was followed by others, including the Norwich and London in 1856, and the Guardian of Manchester in 1863. There was not, however, much business done, owing to the fact that at that time no considerable quantity of plate-glass was in use except in the newer shops, the older shopkeepers not being converted to meet the times until later, and another reason was the novelty of the idea. The general use of plate-glass in shop windows at the present time, and the largely increased sizes of plates used, has created a considerable demand for this class of insurance. In

addition to many plate-glass Offices transacting this class of business only, numerous Offices doing general accident business derive a not inconsiderable revenue from this source.

Systems of sickness insurance in connection with Friendly Societies have been in operation for many years, but it was not until 1841 that the Wesleyan and General Insurance Society commenced its operations with sickness insurance. In the year 1885 the Heath Insurance Company and the Sickness and Accident (now known as the Century Company) were formed to offer the benefits of sickness insurance to the professional and mercantile classes. Several of the old-established Life Offices have now instituted sickness branches, while one of the oldest Accident Insurance Companies has recently brought out a scheme which makes a special feature of monthly premiums.

The first Company formed for the purposes of insuring carriages and other vehicles against injuries by accident appears to have been founded in 1857, but it died out almost before it commenced operations, owing mainly to the want of data upon which to assess premiums. In 1869 a second attempt was made to establish a Company, but the difficulties in the conduct of the business led to its early abandonment, and it was not until 1877 that an Insurance Company—called the Horse, Carriage and General—was established. This Company is still in existence, and claims to be the oldest and largest Office of its kind.

Up to the year 1889 the Companies appear to have limited their operations to insuring horses and vehicles against accidents, but in that year a Company was established to cover, in addition, the legal liability of carriage owners in respect of damage to the persons or property of third parties, owing to the negligence of their drivers. When one considers the number of vehicles which are in use in this country every day, and the hugely increased traffic in our large cities—electric and otherwise—it is evident that there is a large field for this class of insurance. It is the common practice of all owners of vehicles to protect themselves by insurance.

The possibility of insuring against the risk of burglary and housebreaking does not seem to have been contemplated until quite recent times; although a Company was registered for this purpose in 1865, it was not until the year 1885 that a Glasgow Office seriously undertook the business. Other Offices for the transaction of burglary business followed suit, and most of the

existing Companies added this business to the classes of risk already underwritten by them.

The operations of the Companies were at first limited to the insurance of the contents of private houses against loss by house-breaking or burglary, but of recent years the policies of the Companies have been extended to include loss by theft or larceny, and the operations of the Companies have been considerably widened by the introduction of novel features. For instance, one may now insure under a burglary policy jewellery, furs, laces, or valuables of any description, not only in any private residence but anywhere in the United Kingdom or on the Continent of Europe, against loss in any fortuitous manner whatever except by fire.

Not only is it possible to cover personal effects, but the contents of business premises may be insured, and it is possible to cover deeds, securities, and cash against loss by theft. An extension of the principal of burglary insurance is the covering of passengers' baggage against loss or theft. Such policies are issued to any part of the world.

The year 1880 marked an epoch in the history of Accident Insurance. In that year the Employers Liability Act came into operation. This act made employers of labour responsible for injuries to workpeople when it could be shown that such injury was due to the negligence of any person in authority, or to any defect in the ways, works, machinery, or plant. Previous to the passing of this Act the workman could only recover against his employer by proving under common law personal negligence on the part of the employer. It had been found in practice that the workman had the greatest difficulty in proving such negligence, and consequently the employer was very rarely called upon to compensate him. It was readily understood that the Employers' Liability Act imposed a very serious liability upon employers of labour and that it was encumbent on every employer to cover his liability. Companies were promoted to meet the demand for insurance, and many of the Offices then existing also took active steps to secure their share of the business, thereby very considerably increasing their premium income.

The Act worked fairly satisfactory for some time, but it eventually led to much litigation, as workmen were prone to bring actions against their employers in respect of accidents for which no legal liability existed; this created a hardship upon the employer, as such actions could not be defended without a con-

siderable payment in costs, which, in any event, the employer could not recover from his workmen, the employer consequently finding it cheaper to admit liability and pay compensation rather than defend his legal position.

In 1897 the liability of employers in certain trades for accidents to their workmen was further extended by the Workmen's Compensation Act. As this Act provided that the employer should compensate his workmen for any accident arising out of and in the course of the employment, it was contemplated that the litigation between employer and employed arising out of common law and Employers' Liability actions would, to a very great extent, be done away with. As a matter of fact no Act has probably been productive of more litigation.

The Accident Companies took immediate steps to deal with the great increase in the liability of the employer and the consequent volume of business to be secured. New Companies were formed, and some Fire and Life Offices embarked in the business, utilising the great advantages of their extensive agency connections. The calculation of rates at first was largely a matter of surmise. The Act was so loosely drawn up that opinions differed widely as to its interpretations; reliable statistics relating to accidents in different industries were difficult to obtain. The amount of compensation paid to workmen during the first twelve months of the working of the Act was comparatively small, owing, no doubt, to two causes—firstly, a tendency on the part of the Courts to be guided by the strict letter rather than the spirit of the Act; secondly, the fact that the workmen and their organisations had not become fully alive to the benefits this Act conferred upon them. These considerations encouraged, and seemed to justify, a considerable reduction in the rates which it had been thought necessary to charge in the first place, and resulted in a "war of rates" between the Offices. Gradually, however, the Courts commenced to liberalise the reading of the Act, and the workmen became more alive to the benefits which were obtainable under the entirely new conditions which the Act had created. The cost of claim settlements became more onerous, and it was soon apparent that the Offices who had competed so keenly for the business had obtained it at rates which were not remunerative. Although many Companies have greatly increased their premium incomes from this source, the business so far cannot be said to have strengthened the financial position of any Office. It is satisfactory

to be able to state that the Companies are now showing a disposition to accept risks only at rates which experience has shown to be necessary.

Having briefly discussed the origin and nature of the various classes of accident insurance which form the principle sources of revenue of the Companies, it is desirable that we should now consider the radical changes which have taken place in personal accident insurance during the last quarter of a century.

Up to the year 1880 the policies issued by the Companies had undergone no material change, but in the year 1881 the Scottish Life Office introduced the payment of capital sums for the loss of eyesight or of limbs. The idea is believed to have been borrowed from a French Company, and was immediately adopted by the Accident Offices. A Manchester Office as an attraction to total abstainers then offered policies at reduced premiums.

The next extension of the scope of the accident policy was the doubling of the benefits payable in case of railway accident. This was shortly afterwards followed by the addition, at a slightly increased premium, of weekly allowances for disablement caused by typhus, typhoid, measles, smallpox, and scarlet fever. Competition quickly led to the addition of numerous other diseases to this limited list, the Companies vying with one another in adding thereto. In including under the policy the five infectious diseases I have enumerated, the Offices were undoubtedly adding to the benefits of the insurance, these diseases being of common occurrence. It seems a pity that Companies should depreciate from the value of what they appear to offer in their prospectus by the addition of diseases whose occurrence is fortunately out of all proportion to the terrifying effect produced by the recital of their names. For instance, the inclusion of beri-beri—a disease practically unknown in this country; intussusception—a trouble peculiar to children; spinal meningitis, leprosy and acromegaly—diseases of the rarest occurrence—confer benefits which are more apparent than real. A wide medical knowledge has not, up to now, been considered necessary to the equipment of an insurance canvasser, but an accident inspector will shortly require a medical training, or, when canvassing with agents, he must be accompanied by a medical man, in order that the benefits offered by the prospectus may be properly explained to the prospective client.

Further extensions of the original simple accident policy are the provision of a pension in case of permanent disablement; an

allowance in event of death from certain diseases; the payment of surgeon's fees in the event of operations rendered necessary by certain diseases; the doubling of the benefits in the event of injury sustained whilst riding in licensed vehicles or lifts. It is now possible to obtain a policy covering disablement from sickness of any description in addition to the inclusion of these numerous contingencies. Whilst the benefits conferred by the policy have been materially increased the conditions and restrictions of the policy have been considerably modified in favour of the insured.

It is impossible in the short time at our disposal this evening to more than allude to the various minor branches of insurance transacted by Accident Offices, and it must suffice to say that they include among others the following—Accidents to hoists, lifts, and cranes, boiler inspection, and insurance against explosion, mortgage risks, bad debt insurance, loss of documents, forged tranfers, chemists' and druggists' prescriptions, contract guarantees, and motor-car risks.

I have attempted briefly to sketch the development of a branch of insurance business which was inaugurated sixty years ago for the simple issue of tickets to railway travellers, but which now includes in the variety of contingencies it underwrites almost every risk other than those peculiar to the business of Marine, Fire, or Life Offices. The British Offices number more than eighty, and their revenue from accident and contingency sources has grown from a few hundreds to more than £4,000,000 per annum, whilst the varied and complex character of the risks undertaken involve a specialisation and concentration on the part of those engaged in the business which makes its pursuit of much attraction and unvarying interest.

LEGAL ASPECTS OF LIFE ASSURANCE.

By JOHN L. MOUNSEY, W.S.,
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A Paper read before the Insurance Society of Edinburgh, 20th February 1906.

THE title of this address requires qualification. Life Assurance and Law touch at too many points, and in ways too various, to permit of anything approaching an exhaustive review in the limited time available. It is necessary, therefore, to select.

Considering the vast dimensions to which the business of Life Assurance has grown, and the considerable part which Scottish Offices have had in its development, it is remarkable what a small space it occupies in Scottish legal annals and what modest demands it has made on the time and attention of the Scottish Courts. There appears to be no Scottish treatise specially devoted to it. The institutional writers, as late as Erskine—who wrote little more than a century ago—have little or nothing to say of it. In the more recent reports and legal literature the space devoted to it is comparatively small. A significant fact, surely indicative, one may fairly suppose, of harmonious relations between insurer and insured; of circumspection, liberality, and forbearance on the part of the Offices.

Life Assurance is not fettered to territory or nationality. It is carried on all over the world. Naturally its principles are, in the main, *juris gentium*. The decisions of the Supreme Courts of one country on points of principle are received, if not as authorities, at least with respect by the Courts of other countries. "For from the same premises the sound conclusions of reason and justice must be the same."

Petty v. Royal Exchange Assurance, 1757, 1 Burr. (K.B.) 341.

But the municipal law of each country which has a developed legal system of its own, presents in this, as in other branches, peculiarities in detail which must not be overlooked. Speaking to a Scottish audience, I naturally turn mainly to Scottish law and experience for authority and illustration.

Scot. Prov. Inst. v. Robinson, 1892, 29 S.L.R. (O.H.) 783.

The aspect of the matter to which I invite your attention first has reference to classification.

Classification is not a mere academic matter, as might at first be supposed. When any novel combination of interests arises between man and man the question is—what legal results are to be attributed to it? If it can be brought within one of the known legal categories the question is soon solved. If not, the solution must be slowly determined by repeated judicial decisions. A new branch of the law must be elaborated to cover the new phenomena.

In which of its categories does the law place Life Assurance? It is obviously a contract. Naturally, we expect to find it classed as a specific form of the contract of insurance, which again is a specific form of mercantile contract.

Insurance is differentiated from other mercantile contracts by several specialties. Perhaps the most prominent is the circumstance that, whereas the object of most contracts is the acquisition of pecuniary gain, that of insurance is mere indemnification
May I. 1. against pecuniary loss. It is, says one authority, "A contract whereby one, for a consideration, undertakes to compensate another if he shall suffer loss. . . . This principle underlies the contract, and it can never, without violence to its essence and spirit, be made by the assured a source of profit; its sole purpose being to guaranty against loss or damage."

There is no difficulty in applying that definition to such forms of insurance as Fire Insurance and Marine Insurance. In these the insured is never allowed (or, at least, is never supposed) to make a pecuniary profit out of the transaction. The only difficulty is to find a precise measure of the loss.

But when the definition is applied to Life Assurance discrepancies become apparent. Plainly, Life Assurance is not always a contract of indemnity. It is often something quite different.

It *may* be a contract of indemnity and no more. If a creditor insure the life of his debtor to the extent of his risk, his object is not gain, but protection against loss. The death of the debtor might make the debt irrecoverable. But what is to be said of assurance on one's own life? Or of assurance on a life in which the insured has no interest, pecuniary or otherwise? Can it be said that such are contracts of indemnity? Indemnity to whom, against what, and how measurable? Will money indemnify a man for the loss of his life? Even to those left behind, a man's death

may or may not be a pecuniary loss. The fact is not to be disguised that, in many cases, the Life Assurance is pure gain to survivors. There may be insurable lives, the cessation of which would relieve the relatives of a pecuniary encumbrance. Assurance on a life in which, apart from the assurance, the injured has no pecuniary interest, can have for its object pecuniary gain and nothing else.

If such forms of assurance be not contracts of indemnity, can Life Assurance as a species be co-ordinated with the normal contract of insurance?

It seems impossible. The inclination, accordingly, is to class Life Assurance as a contract *sui generis*, and call it a contract of mutual risk. Erskine's Prs. 3, 3B, 29.

A contract of mutual risk is, legally speaking, a wager, a speculation, a gaming or gambling transaction. Erskine's Prs. 3, 1, 6B.

Wagering or gambling appears to be quite a legal institution in the Common Law of England, but ours is more puritanical and will not enforce such transactions. Even with us, however, I am not aware that any Insurance Office ever sought to escape from liability on that ground.

As a matter of historical fact, Life Assurance in its early days was, to a great extent, a matter of open wagering or gambling on lives. As such it became a fashionable craze about the middle of the eighteenth century, and was carried to such extravagant and indecent lengths as to threaten the public safety and morality. Francis' Annals, 140. The legislature thought it necessary to intervene, and in 1774 a remedial Act was passed, known as the "Gambling Act." 14 Geo. III., c. 48.

The preamble indicates the evil which prevailed:—"Whereas it hath been found by experience that the making of insurances on lives or other events, wherein the assured shall have no interest, hath introduced a mischievous kind of gambling."

For remedy, it was enacted:—"That no insurance shall be made . . . on the life or lives of any person or persons, or on any other event or events whatsoever, wherein the person or persons for whose use, benefit, or on whose account such policy or policies shall be made shall have no interest, or by way of gaming or wagering; and that every assurance made contrary to the true intent and meaning hereof shall be null and void to all intents and purposes whatsoever."

It was further enacted that no policy of insurance shall be legal unless it contain "the person's or persons' name or names

interested therein, or for whose use, benefit, or on whose account such policy is so made or underwrote," and finally, that "no greater sum shall be recovered or received from the insurer or insurers than the amount or value of the interest of the insured in such life or lives or other event or events."

The statute has been judicially interpreted here and in England on several important points.

Turnbull & Co. v. Scot. Prov. Inst., 1896, 34 S.L.R.(O.H.) 146.

In a Scottish case, which went no further than the Outer House, the circumstances were these. A firm of merchants in Leith had an agent in Iceland through whose connection, as they averred, they enjoyed a lucrative business in the island. To secure themselves against loss of trade in the event of death depriving them of his services, they assured the life of the agent for £2000. The policy was dated 24th December 1894. It contained a note to the effect that the insured had stated an insurable interest in the life, and "no further proof of their interest will be required when this policy becomes a claim." The agent died on 9th April 1895, and the insured claimed on the policy. It then transpired that the contract of agency was terminable on three months' notice on either side; and between the date of the proposal and the issue of the policy the agent had given notice terminating his agency at 1st March 1895. Consequently, at the date of the death, the insured had no pecuniary interest in the life. The Insurance Company was not made aware of that circumstance.

The insurers, among other grounds of defence, pleaded the statutory nullity, want of insurable interest. In dealing with that plea the Lord Ordinary (Kincairney) remarked:—"The objection of no interest is not a favourable one. It is a technical objection, or nearly so, seeing the nature of the pursuer's interest does not affect the defender's risk, and it rests on the Gambling Act (14 Geo. III., c. 48), by which policies made by one on the death of another in which he has no interest are declared void. That is an enactment in the public interest, not in the interest of Insurance Companies. But, no doubt, the defenders are entitled to plead it."

There seems to be great force in the view that the statutory objection is not a favourable one in the mouth of the insuring Office. The risk would be the same and the premium the same whether the insured had insurable interest or not. The presence or absence, nature or extent, of insurable interest makes no

difference in that respect. But the statute has in view the public interest. It is not easy to see who but the insuring Office could plead it, or how the public interest could be vindicated at all, unless by the Offices repudiating liability upon the statutory grounds, or by the Courts applying the statutory nullity on their own initiative.

In a more recent case the matter came up under a different aspect. A father took out a policy of assurance in name, and on the life, of his son, a boy of 18. He retained the policy in his own possession and paid the premiums. On the son's death, predeceased by the father, the Office paid the claim without demur, but a competition arose between the son's representatives and the father's. The former pleaded, *inter alia*, that the money could not belong to the father's representatives because he had no insurable interest in the son's life. In dealing with the plea, the Lord Ordinary (Pearson) observed :—"I am asked to prefer the view which would make it (the policy) a legal instead of an illegal contract. So far as this plea is urged as affecting the antecedent probability of a father's insuring the life of his son and keeping the policy as his own, I am not disposed to allow it any weight. On the other hand, if it is meant that the father's general representatives cannot vindicate the fruits of the father's illegal contract, I think that is a misapplication of the statute. The statute, in my view, furnishes a defence to the Insurance Company if they choose to plead it; but if they do not, the question who is entitled to the money must be determined as if the statute did not exist."

Hadden v. Brydon, 1899, 1 F. 710.

Worthington v. Curtis, 1875, Law Rep. 1 Ch. Div. 149, p. Ld. Jus. Mellish.

The claim of the father's trustees was sustained. On appeal, the Court (First Division) adhered. Adverting to the statutory objection, the Lord President (Robertson) remarked :—"The answer is that it has been decided, on grounds that are clearly valid, that the statute merely furnishes a defence to the insuring Company against a claim on the policy; but that, if the Company waive the defence, the question who is entitled to the proceeds of the policy falls to be determined as if the statute did not exist. Accordingly, as the Insurance Company have paid the money, the plea disappears."

On the other hand, in a later case in England, the Court of King's Bench took the view that the statutory nullity must be applied on the Court's own initiative, though not pleaded by the insuring Office. The case had reference to a marine insurance policy, but the principle is the same.

Gedge v. Royal Exchange Assurance, 1900, 2 Q.B. 214.

19 Geo. II., c. 37.

The circumstances were curious. The Government of Japan, in November 1898, made an ordinance whereby goods imported into that country after 31st December 1898 should be liable to higher duties. Obviously, it would make a considerable difference to the owners of goods in transit at the time of the order whether the goods arrived before or after 31st December. Apparently merchants who had cargoes afloat affected insurances to cover that risk—which was quite a legitimate proceeding. But it occurred to an ingenious gentleman, who had no goods in transit, that here was an opportunity for what he called a "spec." He ascertained from the newspapers that a certain vessel had passed the Downs on her voyage to Japan on 30th October, and, as the voyage takes about two months, it was evidently a matter of uncertainty whether her arrival would be before or not before 31st December. He took out a policy of insurance as for a voyage of that particuship from London to Yokohama—the underwriters to pay as for a total loss if the ship did not arrive before midnight on 31st December 1898. The policy bore that it should be deemed full and sufficient proof of interest. The insurers did not know that the insured had no interest. The ship failed to arrive in time, and the insured claimed payment. The insurers did not specifically plead the statutory objection at the proper time. But the Court held that the statute, being a public statute passed in the public interest, must be judicially noticed, whether pleaded or not. The claim was on that ground rejected.

The Canadian Courts carry the principle so far as to hold that the statutory nullity cannot be excluded by an "indisputable" policy. [Bunyon 129.]

The view that the plea is an unfavourable one in the mouth of the insuring Offices finds indirect expressson in the liberal interpretation which the Courts give to the term "interest." They restrict its meaning, indeed, to pecuniary interest where the assurance is not on the insured's own life. But, with that limitation, they gave it a very flexible construction. Every one is allowed an insurable interest in his own life to an unlimited extent. And as regards the lives of others, a creditor is allowed insurable interest in the life of his debtor; a cautioner in the life of the principal; a partner in the life of a co-partner; a principal in the life of his agent; a master in the life of his servant; a servant in the life of his master who has engaged him for a term of years; and even (in the Western Hemisphere) an engaged lady in the life of her fiancé. [Simcock v. Scot. Imp. Ins. Co., 1902, 10 S.L.T. (O.H.) 286.] [Bunyon 25.]

Where the relation of the parties is not of contract but of kindred, insurable interest may be admitted if the relationship carry with it legal duty of maintenance. Kindred alone, however, is not enough in any case, apart from pecuniary interest. A father has no insurable interest in his child's life merely by reason of kindred. But in Scotland a child is liable to maintain an indigent parent. If the circumstances were such as to bring that duty into play as an active obligation, it may be that insurable interest would be allowed. The question, however, has never occurred here. English decisions on the point are adverse, but the law of England is not quite identical with ours as regards the reciprocal liabilities of parent and child for maintenance.

A wife is allowed an insurable interest in her husband's life, and it seems to be taken for granted that a husband has insurable interest in his wife's life. But the latter point has never been expressly decided here. Wight *v.* Brown, 1849, 11 D. 459.

The courts have favoured the insured in another direction by reading the statute as requiring insurable interest only at the time when the policy is effected. Initial interest sufficies, notwithstandstanding it cease before the death or that the policy pass into the hands of an assignee who never had an insurable interest of his own in the life.

The aspect of the subject next to be noted is the extent to which the element of good faith enters into the constitution and validity of the contract. In most contracts parties negotiate at arm's length. Each is on his guard. Each relies on his circumspection and judgment. If either make a bad bargain, *sibi imputet*, provided he be not fraudulently misled. But in insurance, and particularly in Life Assurance, the insurer must of necessity depend implicitly on the statements of the insured for the means of estimating the risk. There are necessarily many particulars of a strictly personal nature, connected with constitution, habits, life history, and other personal characteristics and circumstances, which may materially affect the risk, and of which the insured alone can speak from personal knowledge.

Consequently, the law regards the contract of Life Assuarance as eminently one *uberrimae fidei*; and lays on the insured a stringent duty to make full and frank disclosure of the circumstances which are relevant and material to the risk, and fairly within his knowledge.

The Insurance Offices go further. They make the insured warrant expressly, not only the truth, but the exhaustiveness of his disclosure. They make the insured's warranted "proposal" and "declaration" the basis of the contract, with a penalty of nullity of policy and forfeiture of premiums paid, if the disclosure prove in fact to be less or more than exhaustive truth. There have been many controversies over the question whether or not the edge of an erroneous statement or of an incomplete disclosure can be turned by the *bona fides* or the ignorance of the insured, or by the immateriality of the circumstance.

The least taint of fraud is fatal. But suppose the insured tell, truthfully, according to his belief, all he knows and thinks material, yet it turn out that on some point or other he was mistaken or his knowledge imperfect—does the innocent discrepancy destroy the contract?

The insurer is so far privileged that the presumption is adverse to the Office, and it is a strong presumption. Fraud, misrepresentation, or concealment are not presumed. The Office has entered into a formal contract. It must show cause why the contract should not be enforced. "I agree," said the Lord Chancellor in one case, "the burden is on the insurers." They must make out their defence clearly and conclusively.

Standard L. A. Co. v. Weems, 1884, 11 R. (H.L.) 48.

The Court of Session was slow, even where there was stringent warranty, to hold an insurer bound to more than one honest disclosure of material facts to the best of his knowledge and belief.

Life Assn. of Scotland v. Foster, 1873, 11, M. 351.

In one case the assured, a female, explicitly declared that she did not suffer from *hernia*. The statement was imported into the declaration, and the declaration was made the basis of the contract. It afterwards transpired that at the date of the proposal she was aware of a slight swelling in the groin; but she was quite unconscious of its significance, and, consequently, it never occurred to her that she ought to mention it. The swelling developed into *hernia*, which ultimately caused death.

There was here, undoubtedly, failure to disclose a known fact, which ultimately proved to be of the highest materiality to the risk. But the failure was perfectly innocent. The good faith was not questioned. The assured knew the fact: she did not know its significance or materiality.

The Court, by subjecting the language of the warranty to a critical construction, came to the conclusion that it did not extend

to a latent and unsuspected ailment. The judgment might now be criticised, but it was referred to and approved in the House of Lords in a later case. Standard L. A. Co. *v* Weems, *supra.*

It is, of course, of the utmost importance to distinguish between unqualified statements of fact on the one hand, and facts expressed in terms of belief or personal opinion on the other. Qualified statements of fact must be taken with their qualifications, and expressions of opinion only require to be *in bona fide.*

The later development of the law of warranty has been against the insured and in favour of the Offices. It may be taken as settled that the effect of a declaration and warranty in the form now in universal use goes far beyond warranty of *bona fides* and exhaustive disclosure of known material facts. The warranty makes every statement of fact material, and every omission to disclose any material fact, however innocent and unwitting the omission may be, a ground of nullity.

If there be no express warranty, or the warranty does not apply to the particular point, the position is more favourable for the insured. The issue will turn on the presence or absence of *bona fides* and materiality.

The latter element calls for a few remarks. Materiality is a question of fact, not of opinion—least of all of the opinion of the insured himself. It is a question for the Court or jury.

One answer, which is sometimes difficult of construction, is that regarding temperate habits. The word "temperate" is admittedly a relative term—relative to individual constitution, position in life, class habits.

"I believe it is useless," said Lord Watson, "to attempt a precise definition of what constitutes 'temperate habits' or 'temperance' in the sense in which these expressions are ordinarily used. Men differ so much in their capacity for imbibing strong drinks that quantity affords no test; what one man might take without exceeding the bounds of moderation another could not take without committing excess. In judging of a man's sobriety, his position in life and the habits of the class to which he belongs must, in my opinion, always be taken into account, because it is the custom of men engaged in certain lines of business to take what is called refreshment, without any imputation of excess, at times when a similar indulgence on the part of men not so engaged would be, to say the least, suspicious. But," he adds, "I do not think the habits of a particular locality ought to be taken into Standard L. A. Co. *v.* Weems, *supra.*

account, or that a man who would be generally regarded as of intemperate habits ought to escape from that imputation because he is no worse than his neighbours."

Lord Fitzgerald remarked:—"Temperate habits is a sentence to be interpreted, and though not to be taken in the Pythagorean sense of 'total abstinence,' yet seems to import abstemiousness or, at least, moderation. I gave in the course of the argument what I think is the best definition:—

'The rule of not too much, by temperance taught.'

I am inclined to adopt a fair and liberal interpretation, having regard to the position of the individual, the habits of the locality, and even the peculiarities of the local municipal authorities in adjourning to neighbouring public-houses 'to continue the debate.'"

Erskine's Prs., 3, 3B, 32.

Some distinction is drawn between statements made in the proposal and answers given to the medical officer, and between statements made by one insuring another's life and statements of one insuring his own life. The latter, in each case, are given a more favourable construction.

The law is now pretty clearly settled on these points. It only remains to notice how the penalty of cancelment of the contract and forfeiture of premiums paid is dealt with in practice. If there be defective disclosure, actual or technical, the Courts will apply the penalty according to the terms of the contract, if that penalty be demanded. But there is a power behind the judicial throne which has a voice in the matter—namely, public opinion. An Office which exacted its pound of flesh in the spirit of Shylock would be apt to suffer retribution—in public reprobation and loss of prestige. The Offices appear in this, as in other respects, to appreciate Portia's encomium of mercy—

"It is twice blest.
It blesseth him that gives and him that takes."

An Office which treats innocent error leniently will not fail of its reward. Conscious and intentional deceit, of course, deserves no mercy.

One other aspect of the subject may be mentioned. Time will not permit of more. Any objection which strikes at the existence of the contract *ab initio*, such as fraud, breach of warranty, misrepresentation, or concealment of material facts, is as potent against an assignee for value as against the insured himself. This

rests upon the general principle that an assignee of a personal obligation is liable, in a question with the debtor, to exactly the same objections as could be pleaded against his predecessors in right. The importance to the Offices is obvious. The only point on which they require to guard themselves is the risk of condoning such objections by accepting premiums after the objection and the transfer of the interest in the policy come to their knowledge. There are pretty strong expressions of opinion from the bench that an Office ought to take action, or at least warn the insured or the assignee—and more particularly the assignee—as soon as it becomes possessed of substantial knowledge of the objection.

Scot. W. Fund *v.* Buist, 1078, 3 R. 1878. Buist *v.* Scot. Equit. L.A., 1878, 4 R. 1076, 5 R. (H.L.) 64.

NOTES ON FARMING STOCK POLICIES AND LOSSES.

By H. ORTON SMITH.

A Paper read before the Insurance Institute of Birmingham, 15th December, 1905.

The amount of time at my disposal since I undertook, at the request of our Secretary, to read a paper upon the subject of farming in its relation to fire insurance, has been inadequate to enable me to grapple in a way I should have liked, and you have a right to expect, with a subject of so great importance and interest. Moreover, I have been to some extent unsuccessful in my endeavour to obtain data in regard to the experience of the Offices in farm risks, without which I cannot help feeling anything in the nature of a discourse upon the matter, however unpretentious, is incomplete.

It is hardly necessary to remind you of the importance of farming as an industry in this country, both from the political and economic aspect, as well as from the view of the vast numbers of the inhabitants of these islands who are engaged in agriculture, and of the very considerable amount of capital involved. The following figures will, however, bring our general impressions into a more concrete form and enable us to appreciate what a very large amount of property is in the hands of the farmers, a considerable proportion of which is at this moment at the risk of the Insurance Offices.

Statistics.—There were in Great Britain—that is excepting Ireland—in the year 1904, 511,584 farm holdings, representing a total acreage of 32,317,010 acres. Of these holdings more than one-half were under 50 acres in extent. The estimated farm capital of the United Kingdom as on the 4th June, based approximately on an average of the three years 1891-3, amounts

to the huge total of £319,013,868. This amount may be divided as follows :—

Live Stock	£194,148,080
Growing Crops (seed, manure, labour, and half year's rent).. ..	69,510,788
Corn, hay, and straw in stock ..	13,250,000
Wool in stock	5,250,000
Cheese	855,000
Implements	36,000,000
	£319,013,868

It must be understood that these figures are taken before either hay or corn harvest. They are, of course, only an approximation, and relate to a period about 12 years back.

In order to arrive at figures a little less remote, I have endeavoured to compute the value of this year's corn and hay harvests for Great Britain. I have taken from the returns of the Board of Agriculture the estimated yield in respect of wheat, barley, oats, beans and peas, and worked these out at the respective current market prices. I have allowed so much per acre for straw, according to its description, and have taken clover and hay at the present average net market price. On these lines the value of this year's harvest in England, Wales, and Scotland works out as follows :—

Corn	£33,177,095
Straw	13,274,312
Hay and clover	24,693,969
	£71,145,376

These figures are probably below the mark. They, of course, take no account of old corn, hay and straw remaining on the farms, nor do they include the root crop or hop yield. Statistics are not very interesting, and not always convincing, but I think I have at any rate shown the very important position farming occupies as a trade in this country.

General Remarks.—Farming, as you are aware, as carried on in this country at the present day, consists chiefly of stock and dairy farming. Market gardening is also carried on on a large scale, generally in the vicinity of the big towns and in certain districts—

Evesham, for example, where fruit and vegetable culture is the staple industry. Hop growing is also a branch of farming which is confined to certain well-defined districts. The cultivation of corn at the present prices has for many years ceased to pay the farmer. It is estimated that wheat to be grown in this country at a profit must fetch at least 40s. per quarter. The present average price, as on 4th November, is 27s. 10d. The last year in which wheat was at anything like a fair price from the farmer's standpoint was 1883, when it was at 41s. 7d.; in 1873 it was at 58s. 8d., in 1867 64s. 5d., and in 1855 74s. 8d. The price of oats has also depreciated, though not to anything like the same extent, and there does not appear to have been any falling off in the quantity grown during the past 30 years.

The acreage under wheat in the United Kingdom during the past year was 1,796,810 acres. This, speaking broadly, was grown for the straw, and in order to maintain the necessary rotation of crops. In 1875 the acreage under wheat was 3,514,088 acres. Thus, during the past 30 years we have seen a large area of arable land laid down to grass, and the farmer, adapting himself to the altered conditions, turning his attention from the growing of bread-stuffs to the raising of beef. The requirements, therefore, of the modern farmer involve various buildings, varing in size and number according to the extent of the holding, in which to shelter, rear, and fatten his stock; machinery driven by hand, horse, or steam power, with which to prepare the food; and, in close proximity to the buildings, his rick yard wherein to stack the produce of the land, the greater proportion of which will in due course be used as fodder or bedding for his stock. I have sometimes heard surprise expressed at the policy of the farmer in thus putting, so to speak, "all his eggs in one basket"; but apart from all other considerations, it is clearly necessary nowadays, more so than in times past, that he should have the food and litter close at hand.

The Fire Risk.

The fire risk may be summed up, somewhat crudely, perhaps, as a number of stacks of inflammable material huddled together in an inconveniently small space and in dangerous proximity to large ranges of buildings, in the construction of which wood predominates. In addition, the distance from a fire brigade station and the difficulty of obtaining water—in many cases the total absence of it—have to be reckoned with, as well as the fact that, given a corn or straw rick once alight, the chances of obtaining salvage of any value are

very remote, no matter how close assistance may be at hand. These circumstances so often render a farm fire a serious loss both as regards produce and buildings. The simple risk is variously increased by the use of steam power for threshing and food preparing; by the increase of fixed engines, steam, oil and petrol; by the very general use of Dutch barns for the storing of produce; by the use of kilns for drying hops and of creosote tanks for the dipping of hop poles; by the overheating of produce; by the nearness of the rick yard to a road or to a building having a chimney; all of which I propose to refer to in detail later on.

As regards the moral risk, there are, of course, men in all classes and trades who regard a fire as a short cut to affluence, or at any rate as an easy way out of a tight financial place. There are such as these, as I know to my regret, even amongst farmers. The cases of arson are, however, far fewer now that farming has settled down in its existing grooves than in the transition times when the unfortunate agriculturist was faced with the alternative of "to burst or burn." The incentive, too, so far as I can see, is small, for so long as a farmer has stock to feed he must replace what he loses by fire, and what he receives from the Office should not be sufficient to do this.

Before leaving the subject of the risk I should like to deal briefly with what I may, perhaps, for sake of distinction, be allowed to call the special risk element already referred to.

The Dutch Barn is, of course, not a new institution, but as hundreds of these barns have been in recent years erected all over the country, and have now become an integral part of the farm buildings, it is of interest to consider how they affect the risk. These barns, familiar to all of us, consist of a curved corrugated iron roof carried on iron posts with a timber wall plate, the gable ends of the roof being generally closed in, with a door in the centre. The size of these buildings varies according to the requirements of the farm; some I have come across being as much as 100 feet long by 30 feet wide, and even larger. The spaces between the columns which support the roof form bays, and in each space or bay produce would be separately stacked to the roof; that is to say, the end bay might be filled with clover, the next two with hay, and so on. As, however, produce sinks very considerably after stacking, the practice is to fill up again either from the adjoining bay, or with any produce that may be coming in from the field—a practice, by the way, which, in the event of loss,

sometimes renders it very difficult to compute the quantity by measurement. The convenience of these barns to the farmer is, it will be seen, very great. There is always cover ready for his produce, no thatching is required, and no rick poles or sheets. The produce of the whole farm is thus often gathered together under one roof. In the event of an outbreak of fire the flames running up the loose ends of the outside reach the roof. Here is plenty of loose inflammable material, and the resistance of the roof, and the draught which the hot air creates in the confined space, rapidly drive the flames along from end to end of the barn. The difficulties of coping with a fire in a barn are great, as it is impossible to get at the seat of the fire (which is almost always on the top) owing to the roof. The roof, furthermore, gets red hot.

An interesting question arose a year or two back as to the position of the Offices in the event of hay in one of the bays of a Dutch barn overheating and causing the destruction of hay in the other bays. The point was this—Could the property in the other bays be regarded as separate stacks, seeing that such actually adjoin the overheated hay, the only line of demarcation between the several bays being an imaginary division or line drawn between opposite columns across the barn? I may state that in such cases I have always regarded the hay in each bay as constituting a separate stack, and allowed for damage arising thereto from fire caused by the overheating of hay in one of the bays.

The *use of steam power* on a farm is in the case of the smaller holdings confined to threshing operations. The engine and tackle are in these cases usually hired. The owners of these are frequently men of small means who have picked up the engine and threshing machine for a trifling sum at a sale, the former being not always innocent of defects. The larger farmers keep their own engine and tackle, a fixed engine being often erected in one of the buildings or in a lean-to adjoining. Where a large stock is kept the engine would be used once or twice a week for purposes of cutting chaff, grinding corn, breaking cake, etc., slicing and pulping roots, and so forth. A small petrol engine has recently been put on the market specially adapted for farm work, and is now in use on several large estates. These engines, though not on wheels, are quite portable and can be taken into the buildings, rick yard, or fields as occasion may require. The reservoir is in the base of the engine. The possibilities of danger of fire

connected with the use of these engines appear to be the chance of a knock from a cart whilst in the open, or the risk of petrol spilt in filling, or of a possible drip or leakage. Further, the storage of petrol on a farm is a question which it will be scarcely advisable to leave to the discretion of farmers.

Another point which affects the fire risk is the situation of the rick yard. Where this abuts, as is frequently the case, on the high road, or a right of way runs through the yard, the chances of a fire from a light carelessly thrown down, or in the former case from sparks from a passing traction engine, adjacent chimneys, or other sources, are of course increased.

Rates. The rates per cent. per annum under the farming property tariff (England, Wales, and Ireland) are as follows:—

Buildings.— Farm houses, thatched, 5s.

Farm outbuildings: Brick and tiled or slated; Timber, and any other construction, and tiled or slated; Thatched, not having any chimney therein and not adjoining any building having a chimney, 3s.; Thatched and having a chimney therein or adjoining any building having a chimney, 5s.

Dead Stock—England and Wales.—Agricultural produce, farming-stock, implements and utensils of husbandry, with liberty to use a steam threshing machine, 7s. 6d.

Hops in farm out-buildings (excluding oats and stowages communicating therewith whilst fires are alight in the furnaces), *for a period not exceeding three months*, 2s. 6d.

Wool in farm buildings, 3s.

Dead Stock—Ireland.—Produce, implements, &c., as above, 7s. 6d.

Wool in farm buildings, 5s.

Live Stock.—England, Wales, and Ireland, 3s. Insurances on produce, either alone or combined with implements and farming stock, are in England and Wales subject to the three-fourths or special condition of average, as is also wool if insured separately. In Ireland similar property is subject to the *pro rata* condition, which also in the Emerald Isle applies to live stock. Insurances without averages may be granted on roots not stored in buildings and on growing crops by separate items; also on produce in any single specified building, or on any specified stacks.

The Proposal Form and Policy Wording.—The proposal form for an insurance on farming stock is, in the case of those Offices that specially cater for this class of business, a very comprehensive and

instructive document, which, if properly studied by the proposer, and filled in and signed by him, should leave very little excuse for those unfortunate omissions and discrepancies which, alas! so frequently crop up when a claim has to be made upon the Company. Some of these forms require the proposer's signature, others do not. The advantages in holding the instructions for Insurance signed by the proposer, in the event of any dispute arising under the policy, are so obvious that the point need not be pressed.

I have before me two proposal forms which I have marked respectively A and B. These are forms drawn up and used by two Offices foremost amongst those specially laying themselves out for farming stock insurances. I have selected them from a number, as they embrace most of the points required to be reviewed in connection with a farm insurance. I believe I am correct in stating that form A contains the wording of the different items as they appear on the policy, by which the live and dead stock of a farmer may be insured. Form A quotes the special condition of average *in extenso*. Form B gives a masterly exposition of it. The two forms between them embody all, or nearly all, the recognised farming clauses, as well as definitions of the terms employed, and instructions and explanations for the benefit of the proposer. They also contain a series of questions—in the case of Form A there are 16, and of Form B 7 only—with respect to the special nature and circumstances connected with the risk proposed to be insured.

Form A divides the insurance in five items, as follows:—

1. On agricultural produce, inclusive of growing crops, fruit, wool, cheese, cider, together with manures, artificial and other food for cattle on the insured's farm, consisting of . . . . acres arable and . . . . acres pasture; subject to special condition of average and farm clauses enumerated hereafter.

2. On agricultural produce, including growing crops within 100 yards of any line of railway, not subject to average; the rate charged being 10s. 6d. per cent.

3. On wool in farm buildings.

4. On implements and utensils of husbandry (£40 limit on one article).

5. On live stock (£40 limit on any one animal).

Form B divides the insurance into three items:—

1. On agricultural produce, viz., crops of all kinds, as hay, corn, straw, peas, beans, fruit, hops, seeds, hemp, flax, and such like,

whether growing or severed, also wool, milk, and cheese, and all such results of the agricultural operations on the farm. (It should be noted that the definitions of agricultural produce, and of farming stock and live stock in the following items, do not form part of the wording of the policy.)

2. On farming stock, not being agricultural produce or live stock (such as manufactured cattle foods, dung, artificial manures, &c.), implements and utensils of husbandry of all kinds.

3. On live stock (including cattle of all kinds, poultry, dogs used for the farm purposes, &c.)—£40 limit on any one animal.

In each case the insurance on live stock may be divided to cover:—

(*a*) Horses and cattle, limit £100.

(*b*) Live stock (horses and cattle excepted), £40 limit.

If it is desired to insure any horse, bull, cow, or ox for more than £100, or any other animal for more than £40, each must be specifically described and insured separately.

Both forms bear a memorandum to the effect that growing crops and/or roots not stored in the buildings may be insured separately without average. Form B also states that wool in approved farm buildings may be separately insured at the reduced rate of 3s. per cent.

Form B commences with a *nota bene,* which I propose to quote at length later on, calling attention to the fact that agricultural produce may be insured by itself, or may be included with farming stock and implements and utensils; in the latter case the whole of such property coming within the operation of the average clause—which it proceeds to explain. This is followed by a memorandum stating that farming stock, implements and utensils, when separately insured, are not subject to average. The farming clauses in the respective forms are as follows:—

Form A—1. (*a*) Stacks or other farming stock placed and crops growing within 100 yards of any line of railway; (*b*) or of any tank or vessel for dipping hop poles; or

2. Hops and grain undergoing any process of drying are not covered unless specially mentioned.

3. No steam engine allowed to be worked on the farm without an ash-box, or be fed with any material other than coal or coke.

4. Steam or oil engines may be used for threshing corn or pulse, chaff cutting, pulping roots, breaking oilcake, and bruising oats or other food for cattle, but not for grinding corn or pulse,

sawing timber, or for the threshing, breaking, heckling, or scutching of hemp or flax, unless specially allowed.

Form B—1. Property situate or being within 100 yards of the centre of a railway, unless in tiled or slated buildings.

2. Steam engines and machinery of all kinds worked by steam; and

3. Barley under malting, and hops and grain drying in oasts or kilns, or in stowages communicating therewith during such times as the fires are alight, are not insured unless by special agreement.

Having, I think, enumerated the salient features of these two forms, I should like to ask your consideration of the following points in connection with the same.

Growing Crops are specifically included in both forms, though both call attention by memorandum, already referred to, to the fact that growing crops and roots not stored in buildings may be separately insured without average. The inclusion of growing crops in the insurance logically involves the inclusion of all growing crops (including grass and roots), whether green or ripe, in the valuation for average, unless within 100 yards of a railway. Such a practice is, I venture to think, "more honoured in the breach than in the observance," and though the assessor is fully justified in bringing in ripe unsevered corn, having in view the fact that there is a greater or smaller degree of hazard in connection with same, I have my doubts as to whether even this is always done. The wording of many of the Companies' policies excludes growing crops and roots altogether from the policy unless specially insured. There is, of course, no risk attaching to green crops or to roots, unless in clamp or stored in buildings, therefore no reason for insuring same.

Implements and Utensils.—Both Forms A and B provide for the insurance of these by a separate item, though Form A includes farming stock, *i.e.*, manures and feeding stuffs, under the produce item. Form B very carefully and explicitly draws attention to the fact that, whilst implements and utensils may be included in the produce item, if they are so included they will be brought into the valuation for average. In spite of this it is a matter of very common practice on the part of policy-holders (or the agents on their behalf) to bracket these two items together and place one sum on the whole. Whether this is done through ignorance, or to save the trouble of giving divisions, it is hard to say; but when

a loss arises in respect, for instance, of a remote hay rick, and the assessor proceeds to value the ploughs and harrows, carts and trap, mowers, binder, rakes, drills, and even the old land-roll away in the fields, which never was in any danger of fire, surprise is sometimes followed by indignation at the tricks of the insurance people, when the meaning of it all is brought home to the mind of the assured by a little proportion sum, and something less in the matter of compensation than the agreed value of the property destroyed. Having regard to the object of the Average Clause, and the fact that implements and utensils do not fluctuate with the seasons, there would appear to be no disadvantage to the Offices if they always insisted on a separate amount being placed on these. I would further observe in this connection that most of the more valuable farm implements are movable, and in the event of a fire can be, and very frequently are, drawn out of the danger zone; whilst on many farms a proportion of the implements remain on the fields for the greater part of the year, some never seeing the inside of a building (more's the pity, very often) from the 1st January to the 31st December. Form A places a limit of £40 on any one article, a sum which is only exceeded in the case of steam engines, threshing tackle, elevators, and a few special machines not usually found on the ordinary farm.

Steam Engines and Machinery worked by steam power are excluded under Form B, but would be allowed by the wording of A. It does not appear that machinery driven by gas, oil, or petrol engines, or by electricity, is outside the cover of B's policy. Amongst the wordings of other Offices before me are (a) "except machines worked by steam, water, or wind power"; (b) "but not machinery driven by other than manual or animal power"; (c) "that are not worked by gas, oil, or electric power." The extra risk it is contemplated to avoid would appear to be the over-heating of bearings. The tendency amongst the most progressive Offices is to waive this clause altogether, and to accept without reserve the increasingly common adoption by farmers of the use of power in its various modern forms. Certain it is in the event of loss to machinery driven by steam power, where such is excluded from the policy, the farmer invariably professes to be as innocent as the babe unborn of any clause on the policy excluding the machinery in question. Of course, as the assessor never fails to point out in such unfortunate cases, it is the assured's duty to read his policy and make himself acquainted with its contents—

that, indeed, the policy bears an urgent request that this should be done ; but, as a gentleman in the insurance profession remarked not long since when discussing one of these little difficulties, "Thank heaven they don't, for if they did our work would be doubled," or words to that effect—meaning, of course, that every policy would require rewriting at least once.

So far as steam engines are concerned, it may be noted that whilst the same are excluded from the cover of some policies, the proposal form in accordance with tariff provision gives express permission for their use for threshing and other purposes, with certain limitations. There is, however, generally a stipulation that no such engine shall be worked without an ash box, and that coal and coke only may be used as fuel. The wording of one policy before me also bears a provision that "all due precautions be observed in having the funnel guarded by wire gauze."

The Railway Clause.—With regard to this clause it is sufficient to note for the present that the distance from a line of railway within which the liability of the Office ceases, varies in the policies of the different Companies from 40 to 100 yards. Also that whilst some policies exclude all property within the prohibited area, others only mention property in the open or in thatched buildings, property in tiled and slated buildings not coming within the ban. Form A, it will be remembered, provides for the insurance of produce, including growing crops, within 100 yards of a railway at a rate of 10s. 6d.

Proximity of ricks or stacks to buildings having a chimney is not taken exception to in either Forms A or B. Such are, however, excluded by some Offices within a certain distance. Thirty yards is specified in the policy of one Office. This clause would appear to be fully justified by the general experience, and might with advantage be added to all policies. Property in thatched buildings having a chimney, or being in hazard of one, is also an exception in some policies.

The clause which appears in Form A, excluding property within 100 yards of tanks used for dipping hop poles is a wise precaution, though I have always found farmers alive to the desirability of isolating these tanks.

The malting of barley and kilning of hops and grains, the grinding of corn and pulse, sawing of timber, and the heckling or scutching of hemp or flax, are all, of course, risks quite outside the farm tariff, and are properly so excluded.

The Three-Fourths Average Clause.

I have referred previously to a note at the commencement of Form B, which is as follows:—

"N.B.—Agricultural produce may be insured by itself, or it may be included in one item with other farming stock (not being live stock) and implements and utensils of husbandry, but if the sum insured is not equal to at least three-fourths of the total value of the property at the time of the fire the special average condition becomes operative, by which a proportionate part only of the loss is payable by the Office. Example: Property worth £800 at time of the fire being insured for £400, only one half of the loss is recoverable; whereas had the sum insured been £600 or more, any loss not exceeding the amount insured would be payable in full by the Office."

In explaining the three-fourths condition of average to the assured, when such an explanation becomes necessary, I generally adopt the inverse of the above method. I point out that the Office allows a margin of one-third over and above the sum insured before the clause is brought into operation; that is to say, that on an insurance of £300 the average does not apply unless the value at risk be over £400. When, however, it comes into operation it applies *pro rata*. Having regard to the natural fluctuations in the quantity of produce on a farm, and the consequent variation in the values at risk—attaining high-water mark just after corn harvest, and low-water mark just before hay harvest—this has always appeared to me an exceedingly equitable arrangement, with certain limitations. Growing crops and roots, I think, should not, as I have already indicated, be brought into the valuation for average, at any rate so long as there is no risk attaching to them. Neither can I see any equitable reason for the inclusion of implements and utensils in the valuation, seeing that these are always a more or less fixed quantity on a farm. I have already gone pretty fully into this point under another heading, and would only add in this connection that, were it a rule to insist on a separate sum being placed on implements and utensils, a simplification might be effected in the wording of the average clause by the elimination of the words "either separately or in one amount with other property," which, like all parentheses, acts like a red herring drawn across the trail.

A valuation of all the produce on the farm and, when implements are included in the produce item, of all implements,

utensils, feeding stuffs, artificials, and so forth, is always one of the duties of the assessor on attending a farm loss, no matter how small the amount of the claim. I have sometimes been much amused at the entire change in the assured's views as to the value of his property when he comes to realise the object of the valuation; and in this respect the average clause at times becomes a most potent argument for a reasonable estimate, on the part of the assured, of his loss.

Causes of Fires. I can only deal with this important section of my subject in a general way, the time available having been too short to enable me to obtain any reliable data.

It has been estimated that quite 80 per cent. of farm fires are due either to children playing with matches or to tramps maliciously or accidentally setting fire to stacks or buildings. Farmers are more victimised by the tramp than any other body of men in the kingdom. Their ricks and buildings form a desirable resting-place and shelter, where, regardless of the inflammable nature of his surroundings, "Weary Willie" may smoke himself to sleep. If discovered and turned out, cases have been known in which the tramp has returned and fired the ricks by way of expressing disapproval of the farmer's inhospitality.

Incendiary fires on farms are of not uncommon occurrence, a district being sometimes visited with an epidemic of these outbreaks, caused sometimes by a person of weak intellect for the sake of the blaze, sometimes due to labour troubles. Disputes with workmen, or ill-will occasioned in connection with a farmer's duties as a Guardian of the Poor or Justice of the Peace, sometimes result in a claim on the Fire Office.

Threshing operations are always responsible for a proportion of the year's fire bill, due to a spark from the engine, rakings from the ash box improperly damped down, a hard substance in the threshing box, and other causes.

Spontaneous ignition of hay ricks is far more prevalent in some seasons than others. Years when the spring has been wet, the grass consequently unusually sappy, and the crop heavy—more particularly when followed by catchy weather at harvest time, as in 1903—are those in which fires from this cause are prevalent. Although Offices are not liable for damage occasioned to property by its own spontaneous overheating, the overheated rick not

unfrequently ignites adjacent ricks and buildings, causing heavy loss, and even when no such damage is occasioned there are generally claims for extinction expenses to be met. A few words on fermentation, as it takes place in a greater or lesser degree in all ricks, may not be out of place. To quote from an authority:—"Fermentation is a process caused by organisms and accompanied by the evolution of carbonic acid gas, carbon mono-oxide, carburetted hydrogen, and a little ammonia. The mass loses in weight and gets hot, the loss in weight being from one-third to one-half of the whole." Many farmers think that the rick is fired by the internal heat—in other words, that the heat in the rick engenders an internal fire which gradually works its way outwards. Of course, no fire can exist without oxygen. What actually happens is that the gas given off by the fermentation, working its way out of the stack, ignites on coming in contact in sufficient quantities with the air. A hot rick encased in an air-proof substance might go to powder; it would never ignite. The practice of cutting ricks for heat often creates the fire which it is desired to avert. Hot hay cut out of the rick and thrown on the field, or taken away in carts, will often burst into flame after it has left the rick.

The usual wording of the policy condition excluding liability is as follows:—"Excepting damage occasioned to property by *its own* spontaneous fermentation or overheating." This renders the office liable for damage to adjacent property. There are, so far as I am aware, two exceptions to this, in which the wording is:—"This policy does not cover loss or damage by fire occasioned by or through the spontaneous fermentation or heating of the *subject insured.*" In this case the Office cannot be called upon to pay for damage to adjacent produce brought about by the overheating of a rick if they insure agricultural produce. If buildings insured by them were destroyed or damaged by a fire caused by a hot rick, they would, however, be liable. It is hardly necessary to add that badly overheated hay is of little use for feeding purposes.

Railway fires.—Fires caused by railway locomotives are of common occurrence during dry seasons. Although Offices are to a great extent protected by the distance limit, it is a common practice for farmers to take out special insurances to cover stacks and growing crops within the proscribed area, and consequently many claims fall upon the Offices for damage caused in this way.

The question of the liability of the Railway Companies has, in the past, been the subject of many appeals to the Law Courts, with various and conflicting results. It has now been definitely decided that Railway Companies are not liable for damage so caused; but an Act has recently been passed, which does not come into operation until the 1st January, 1908, providing that when damage is caused to agricultural land or crops by fire, caused by sparks emitted from a railway locomotive, the fact that the engine was used under statutory powers shall not affect liability in an action for such damage. The Act does not include buildings, or crops which have been led or stacked. It requires that notice of claim shall be sent to the Company within seven days of the occurrence of the damage, and particulars of damage within fourteen days. From a report of Professor Hele-Shaw, furnished to the Royal Lancashire Agricultural Society, it appears that no special appliances whatever are used by the Railway Companies in this country on their engines for arresting sparks and cinders, except in the neighbourhood of docks. He adds:—"I have made it my business to examine, whenever possible, the discharge of sparks from the funnels of locomotives which are visible at night, and have in my possession a collection of half burnt cinders which have been thrown up and deposited in a red-hot condition upon fields in the neighbourhood of Liverpool. It is hard to conceive a better means of setting fire to crops in a dry condition than by red-hot cinders of such a size, even if great ingenuity were exercised to do so. I have noticed exactly the same thing in the way of cinders being discharged in the North, as well as in the South of this country, and I am prepared to state that I have seen cinders of considerable size discharged in large quantities under conditions that would inevitably cause destruction to ripe standing crops. If such appliances had been used as are in use in other countries, the discharge of such red-hot cinders could not occur to anything like the same extent." No doubt a different state of affairs will prevail in January, 1908.

Traction Engines passing along the road are occasionally responsible for farm fires. In such cases the owner of the engine is liable for the damage. In paying losses in these cases it is customary to take subrogation of the assured's rights against the owner of the engine. These gentlemen are, however, frequently not worth powder and shot.

A short article relating to farm business in Germany appears in

this week's "Policy-holder." You have probably most of you seen it, but will, I trust, all the same, allow me to read an extract from it, as it comes to hand so opportunely and contains some interesting reflections on the causes of farm fires which may not be inapplicable to this country. It commences by stating that "the agricultural section of fire insurance business in Germany has been generally bad and unprofitable for the German fire offices." It attributes this partly to the notable increase of thunderstorms and consequent damage by lightning, and then goes on to say:—"The chief reason, however, of unfavourable results of farming insurance is the moral hazard. German agriculturists have suffered from severe competition, and the native markets have been swamped with cheap foreign produce, while only lately has the Government, after much hesitation and in the face of bitter opposition, resorted to protective duties for the preservation of national interests. The chief cause of deterioration in the *morale* of this section is, however, that factories and mills are now existing in districts formerly entirely devoted to agriculture, and the more remunerative employment and comparative freedom enjoyed by the factory hand attracts the farm labourers, so that the farmers have to fill their places with elements of questionable character from other districts, largely from Poland and Russia, which change has produced an extraordinary increase in the number of fires. These, the seduction of the labourer from the farm to the factory, the association of the peasants with the usually less scrupulous factory workpeople, comparative indifference to the preservation of their property on the part of the farmers, and the low moral standard of the elements imported from abroad to fill the places of the native labourers, are believed to be the chief causes of unsatisfactory results of German farm insurance business."

Experience of Offices.

It is a matter of common report that farming stock insurance is not remunerative to the fire Offices. With a view of placing before you some reliable data upon this branch of my subject, which from a purely trading point of view is after all the crux of the whole matter, I wrote several of the Offices recognised as laying themselves out for this class of business. I admit that I hardly anticipated success; it is not, I know, the practice of Offices to disclose figures of this kind. I am, hovever, indebted to the courtesy of one or two Offices for some information which, if

somewhat meagre, is, so far as it goes, interesting and instructive.

A non-tariff Office doing a local business published a statement for the benefit of its members showing their experience for a period of 34 years, namely, from 1871 to 1904. The secretary was kind enough, at my request, to send me a copy of this statement, which shows a loss of £43,600 over the period named. Only nine of the 34 years show any profit in this class. The figures, summarised, are as follows:—

Losses, expenses, and dividends ..	£301,895
Premiums	258,295
Net loss	£43,600

On analysis, however, these figures do not appear to be so disastrous. Taking the term expenses to be management expenses, and the term dividend to be returns of premium made to members under the mutual system, one cannot help thinking that a tariff office would have regarded the business as fairly satisfactory, providing always it were done at ordinary rates. The following is a summary of the first item as given in the statement; the percentages are mine.

Losses ..	£150,865	or	58·4	per cent. of premiums.
Expenses	65,328	„	25·3	„ „ „
Dividends	85,702	„	33·2	„ „ „
	£301,895			

I would again remind you these are the figures of a Mutual Office, and I am quite possibly getting out of my depth in attempting to analyse them. Be that as it may, they seem to have impressed the directors very unfavourably, for in a special report signed by the Chairman, which accompanies the statement referred to, it is stated that "it is doubtful whether farming insurance has ever added anything permanently to the accumulated funds. . . . There is overwhelming evidence of the constant and serious losses which the business has caused the society. . . . On one occasion it was proposed to discontinue farming insurance altogether in consequence of the heavy losses sustained, and more than once it was proposed that, as they did not earn their dividends, farming insurances should no longer be taken, except under the non-membership system."

One of the leading tariff Offices informs me that farming business has been conducted by them during the period 1890 to 1900 at an average annual loss of £6000 a year. This, of course, would mean loss plus management expenses. These figures, it must, however, be remembered, are anterior to the revision of the farm tariff.

Another, one of the oldest British Offices, has kindly supplied me with the following details:—

	Premiums.	Losses.	Percentage of Loss.
10 years, 1891 to 1900, ..	£91,674	£65,390	71·33
2 years, 1901 to 1902, ..	24,308	9,958	40·93

This would show a trading loss of about 4 or 5 per cent. for the ten years, 1891 to 1900. The revision of the farm tariff took place in the last-named year—1900—and the two succeeding years appear to have benefited thereby, for the result is exceedingly good.

To this is appended a separate statement for London only, showing the loss ratio at 158·93, which emphasises a fact already appreciated by the Offices, that farm risks in the neighbourhood of big towns, more particularly isolated hay ricks, are particularly undesirable.

I regret that the information I am able to submit to you on this vital question of experience is so meagre. Of the actual experience, as the result of the revision of the farm tariff, I have only the two years' figures of one Office, and these are remarkably good. It yet remains to be shown that the revised rating is a failure.

Live Stock.—It is generally understood that the insurance of live stock, taken by itself, is lucrative, and this in spite of the fact that the sum insured on horses, cattle, &c., by farmers forms only quite a small proportion of their aggregate value. The claims made on Offices in respect of live stock are generally the consequence of stroke by lightning, the amounts paid as a result of fires at the homestead being comparatively trifling. This is, of course, due to the fact that if any animals are in the buildings at the time of an outbreak of fire the first care is for these.

The Loss Settlement.

It is customary when defining insurance to speak of it as an indemnity, and this, no doubt, is in some senses correct. It is, however, well recognised that fire insurance in itself is not by any means always a complete indemnity. It should, however, be an indemnity

so far as concerns the assured's loss in respect of the property insured. The basis upon which the amount of this loss is arrived at varies according to the position held by the assured with respect to the property destroyed. The amount of the liability in respect of the same article would differ according to whether it was in the hands of the manufacturer, the salesman, or the ultimate purchaser at the time the fire happened. The position of the farmer as producer is, however, quite different to that of the manufacturer as creator, the cost to produce being no criterion of the loss in the case of the former. A loss by fire places the farmer in the position of making a forced sale. It may be he requires for feeding purposes the produce destroyed, and will either have to replace it or sell his stock. The latter alternative is probably for many reasons not to be thought of; the former entails a loss more or less considerable according to the quantity destroyed and the amount of the required produce available in the neighbourhood, because as claimant he occupies the position of seller and in replacing he becomes purchaser. It would, however, be impossible, of course, to discriminate in such cases, and the hard and fast basis of net market value is not only necessary but generally equitable. In the case of an outgoing tenant, however, the amount of compensation in respect of hay and straw, or such of it as he is required by custom or agreement to ieave on the farm, is what is known as consuming value only. I have heard it argued that because the produce destroyed would have been consumed on the farm the assured is entitled to consuming value only; but this is obviously wrong, as the produce may be regarded as of two-thirds value as fodder, and one-third value as manure, the consuming value representing the former only, whereas both are lost. The usual basis, therefore, of the farm loss settlement is market value less cost of marketing, and in the case of corn ricks, of threshing and cleaning. The prices vary in different districts, according to the requirments of each district and the prevailing nature of the produce grown. The weights at which corn is dealt in also vary in the different markets, the standard measure in some being the quarter, in others the three-bushel bag, the half-quarter bag, the 20-score sack, and so on.

Extinction Expenses I need not refer to here, except to say that they frequently form a very considerable addition to the amount the Office is called upon to pay as the result of a farm fire.

I fear that my paper has exceeded the limits of your patience. I have endeavoured to be concise, and have left, I fear, many aspects of my subject unconsidered. I trust that some time still remains for discussion of some of the points I have touched upon, and in respect of which it would be of great assistance to have your views. It is the duty of the assessor to deal with things as they are, and not to suggest alterations in matters connected with the underwriting of the risk. Questions of rates are quite outside his sphere. The only remarks, therefore, that I venture to make of a general character are that the average farmer, apparently, is either unable, or not disposed to take the trouble, to grasp the technical details of fire insurance as presented to him on the proposal form; and that the assistance to be obtained from the agent is not, as a rule, very valuable. It is consequently, to my mind, very desirable that as little as possible should be left to the proposer's discretion. A form of proposal approved by a tariff committee may be impracticable at present. It appears to me, however, that such a form would be very much in the interests both of the Offices and the proposers.

CHOCOLATE AND COCOA WORKS.

By ARTHUR F. TOOKE.

A Paper read before the Insurance Institute of Bristol, 30th March, 1906.

Cultivation of Plant.

I WILL honestly confess that, until I commenced to acquire data upon this subject, I had a somewhat hazy idea of the manner in which ever-bountiful Nature had bestowed the by no means least valuable of her gifts upon her children, and, to those of you who are similarly uninformed, a few details hereon may prove as interesting as they were to me.

Cocoa is the fruit of a tree known as *Theobroma cacao*, which, being interpreted, signifies "Food for the gods." This tree, an evergreen of wonderful vitality, attains a height of from 12 to 30 feet. From the third year onwards it usually yields two crops annually, the chief seasons being May and June and October and November. It flourishes extensively in the West Indian Islands, Brazil, and Guiana, and its cultivation has also been introduced into Africa and Asia; Ceylon producing a bean of high character. The tree has fine spreading branches, with large handsome bright green leaves. The blossoms comprise small pale-yellow petals on a rose-coloured calyx, and the fruit consists of large pods from 5 to 12 inches in length and from 3 to 5 in diameter, of an elliptic oval pointed shape, something like a vegetable marrow, each containing from 20 to 40 nuts. The average yield of a good tree in fertile soil would be about 100 pods per annum, and as, roughly speaking, it takes 11 pods to produce 1 lb. of cured cocoa, a mature tree would furnish a little over 9 lbs. of cocoa per crop. It may be here remarked in passing, as a striking instance of triumph of art over nature, that this tree produces larger seeds in a state of cultivation than when growing in a wild condition.

The pods, which hang pendulous by a tough stalk from the trunk, and larger bunches are cut down and gathered into heaps. They are then broken open, and the beans, having been removed and cleansed of the fibrous tissue by which they are attached, are conveyed to the sweating house, where they are packed closely together in barrels, boxes, or small rooms, covered with leaves, and left hermetically closed for from four to seven days, the exact period depending on the variety of the bean or upon the quality of cocoa desired. In this condition a process of fermentation, fed by saccharine matter in the pulp, takes place, and carbonic acid and water are given off. Thus the pulp is removed, the bitterness of the bean softened, and the colour changed from a pale crimson to a rich mahogany. Having been strewn on mats or trays covered with red earth, and left for twenty-four hours to complete the fermenting process, the beans, after being cleansed, are again spread out to dry naturally in the sun's rays. When thus cured they are ready for exportation.

Introduction into this Country.

The introduction of cocoa into this country dates from 1656, but the Spaniards, at the time of their discovery of the Great Western Continent in 1494, found it a common article of food among the natives, although nothing is on record as to the precise place it occupied in their dietary. During the eighteenth century several manufactories were started, and it speedily became the fashionable luxury of the rich, "White's Chocolate House" and "The Cocoa Tree," both in St. James' Street, London, being noted taverns in their day. At the present time it may almost be described as a staple food of the people, seeing that the consumption in this country alone last year amounted to over 45,000,000 lbs., and that the United States, Germany, and France are even larger consumers of the commodity than ourselves. This is not to be wondered at when its value as a tissue-forming food is appreciated. Nearly nine-tenths of the cocoa bean is composed of digestible matter, whereas with tea and coffee more than one-half is rejected as waste product, the proportions of woody fibre being as follows:—Tea 20%, coffee 35%, and cocoa 4%. It is claimed that cocoa yields thirteen times the nutriment of tea for the same value and 4½ times that of coffee. To quote Dr. Andrew Wilson, F.R.S.E., the eminent lecturer on health: "Whilst the two latter commodities are, to all intents and purposes, merely stimulants and not foods, the cacao bean undoubtedly embodies a remarkable

combination of nearly all the substances which constitute a perfect nutriment, and may be not inaptly described as a vegetable egg, containing all that is needed to build up the human body."

Analysis. It will obviously be well for us to consider for a moment the chemical composition of the bean itself, and the nature of those commodities which are incidental to its production in manufactured form. Expert analysts appear to differ considerably, but for our purpose it will suffice to give you the following:—

Cocoa Butter or Oil, ...	50 parts.
Albuminoid Substances, ...	20 "
Gum, Starch, and Sugar, ..	13 "
Salts, ...	4 "
Theobromine, ...	2 "
Water and other constituents, ..	11 "
	100

Some authorities state that the roasting of the bean produces a volatile oil which influences in no small degree the flavour and aroma of the cocoa, but in any circumstances it is so minute a part of the whole as to have been overlooked in many an analysis and need give rise to no misgivings in the breast of the fire surveyor.

Excepting the sugar, which is present in insignificant quantity, there would not appear to be any ingredient of a readily combustible character in the bean itself, nor do the incidental commodities added during the process of manufacture—viz., sugar, sago, arrowroot, extract of malt, milk, and numerous flavourings, such as vanilla, almond, lemon, raspberry, peppermint, &c., &c.—present any very formidable feature from this standpoint, other than that which must necessarily always exist more or less where the treatment of sugar by artificial heat is involved. It should not, however, be forgotten that the butter, which assumes so large a proportion of the composition of the bean, and which is really a white inodorous fat, would in all probability render it more or less susceptible to the effect of heat and smoke.

I must now ask you to transfer your mental vision from the sunny climes of those lands which can claim to have given birth to the cacao plant to the smoky atmosphere of one of the large cities

which witness the conversion of its seed into that "food for the gods" which, as the statistics given above will demonstrate, is by no means unappreciated by us mortals.

Process of Manufacture.

We now cross the factory threshold, and the first point to which I conduct you is naturally the unloading and bean storage department. If you have sufficient imagination you will enjoy the agreeable fragrance of the cocoa berry piled here in sacks, weighing

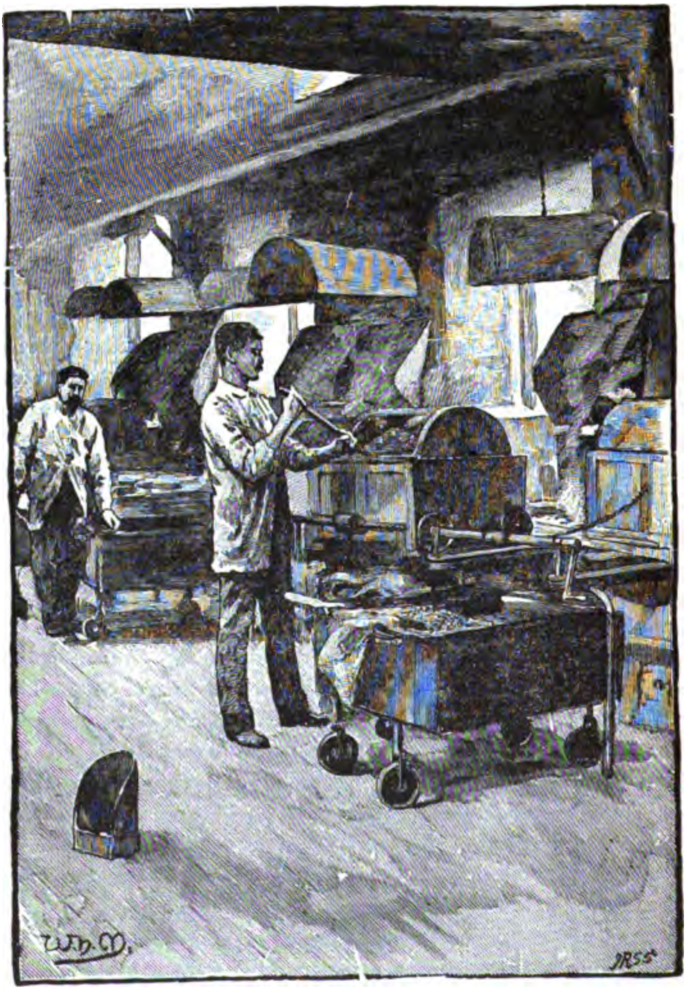


Fig. 1.—Corner of the Roasting-room.

from 1 to 2 cwt., awaiting the initial processes of picking and sifting. The former is effected by hand, and the latter by slowly-revolving sieves, with the dual objects of extracting unsound berries or foreign material and of sorting the nuts into various sizes, prior to their transference into the hoppers of the roasters, which comprise slowly-rotating cylindrical pans heated either by high-pressure steam, gas, or open coke fires, the last-named being the quicker method. Roasting requires the unremitting attention of experienced workmen, who have to determine the psychological moment at which the operation is complete, for upon the accuracy of this depends, to a very great extent, the quality and flavour of the cocoa. Hence we may rest assured that in whichever manner the cooking is effected every possible precaution to prevent accidents of all kinds will be taken. From the roasters the nuts are ejected into large hoppers, and either left to cool naturally or subjected to a powerful cold air blast introduced into the bottoms of the hoppers through air shafts by means of large fans. Care should be taken that this cooling process be properly effected, otherwise there is a possibility of the hot nuts firing. All roasting should cease at least 60 minutes before the works close, and, where practicable, all hoppers connected with the roasters emptied. This point bears the more importance in that some manufacturers will not concede the existence of this danger, and I must admit that, having regard to the fact that the bean, by reason of its shape, cannot lie very closely together, I was at first inclined to be satisfied with the assurance I received to this effect. At one of the largest factories I went over, however, I was informed that this risk was by no means a chimera, and that as a matter of fact outbreaks of fire had actually occurred from overheating of roasted beans. It is needless to say the hoppers referred to must be of metal, not of wood or other combustible material. Some firms cool the bean naturally on gauze wire trays, whereon they do not lie to a greater depth than 12 inches, and to this method I do not think exception can be taken. In one instance I saw the hot bean being passed into canvas bags for removal to another part of the factory. This practice is, of course, to be very strongly deprecated.

The now crisp nuts are conveyed to other hoppers connected with the kibling and winnowing room, where the next treatment is undergone. Here they are first passed through kiblers, which gently crack them, and are then carried from the outlet of those machines by conveyors to a point above the winnower, the power-

ful blowers of which latter separate the nuts from the husks. The former, after being further cleansed of all particles of husk by machines known as dickies—a species of oscillating sieve—appear the rich glossy kernel, which is known on the market as cocoa nibs. These nibs are the purest form in which cocoa is supplied to the public, but they require a lengthy period of boiling to effect their disintegration, and to allow the oil or cocoa butter to rise to the surface, before they can be prepared for use as a beverage. The husks are either ground up and sold to provender millers for mixture with cattle food, or are transported to Ireland and parts of the Continent to be used as a light table decoction, known, I believe, in the first-named country—doubtless to emphasise the

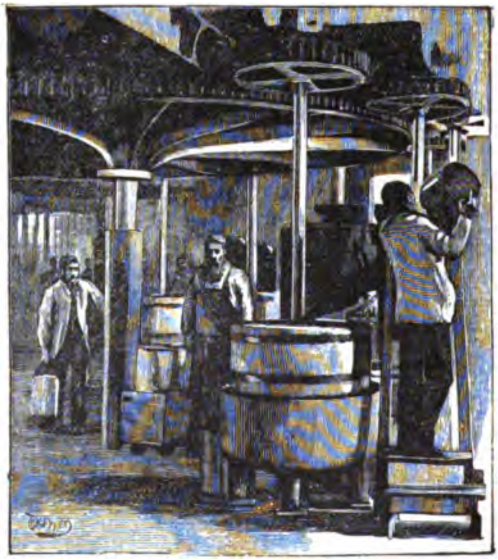


Fig. 2.—Grinding Pure Chocolate.

straits to which the poor inhabitants of that "most distressful country" are put to in obtaining food and drink—as "miserables." I have not had an opportunity of sampling this beverage, but I am assured it is by no means so unpalatable as its name might lead one to suppose.

We next enter the mill or grinding room, wherein the nibs are first passed through machines known as breakers, the name of which is indicative of their purpose, and then introduced into a

series of grinders of graduating fineness which are warmed to a mild temperature by gas or steam. The beds and rolls of the pans are of granite, as metal would set up a chemical action prejudicial to delicacy of flavour. Although when introduced into the first of these mills the nuts are hard and brittle, the natural oil provides sufficient moisture, without addition of any liquid, to convert the nib into an oleaginous paste, which, as the process of grinding progresses, gradually assumes the character of an opaque liquid. This is finally run off into trays and allowed to solidify therein. Up to this point the manufacture of chocolate and cocoa is identical, but here the roads by which they reach finality diverge, and we will for the moment follow that along which chocolate travels. It is not a long one. Incidental to this process is the sugar department, where tons of loaf sugar are reduced to a condition resembling the finest flour. For this purpose are required numerous grinding mills, disintegrators, sifting and dressing machines (wire and silk), and also not unfrequently sugar dust collectors, the latter a "stive" apparatus undoubtedly entailing the same danger of explosion as is met with in connection with the stive room of the corn mill. This sugar-reducing plant may include steam-heated cylinders, but I have come across no cases where fire-heated boilers or furnaces were present in this department, which is quite distinct from the sugar-boiling room. I have, however, seen instances of the rooms wherein the raw sugar is stored being heated by steam pipes, and in one factory the sugar store was immediately over the boilers, which, notwithstanding that the flooring was of concrete, did not appear to be a very reassuring arrangement.

The solid blocks into which the afore-described opaque liquid has congealed are now again ground in a further set of mills known as melangeurs. These machines remind one of the pug mills used by masons and brickmakers. It consists of a round granite revolving slab forming a pan, having sides of steel. Into this receptacle the cocoa is poured and sugar and flavourings added. Two sets of heavy stationary granite rollers bruise the thick mass, which is thus reduced to the consistency of dough, and a double knife similar in action to the screw propellor continually revolves just above the rotary stone slab, distributing the chocolate as it passes. Thence it is conveyed into a series of rolling machines, the granite cylinders thereof flattening and rolling it until it emerges in the same liquid state as before, and in this condition it

is run off into tin moulds of numberless shapes and sizes. These moulds are laid on dancing tables, which by incessant motion shake the chocolate paste well into them. A period of cooling, sometimes naturally and sometimes in cold air chambers, brings the chocolate process to an end.

We must now retrace our steps to that point in the grinding room whereat, you will remember, we for the moment abandoned the cocoa process.

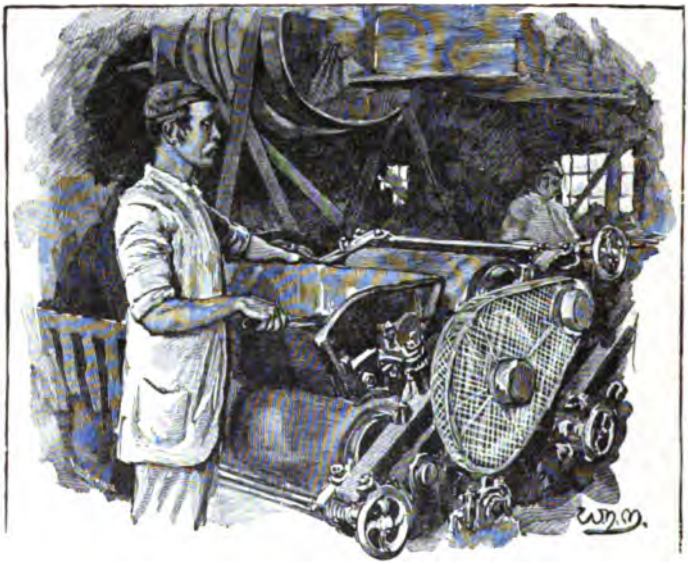


Fig. 3.—Rolling Sweet Chocolate

There is a saying, originated by a popular comedian now no longer with us, that there are three kinds of eggs, *i.e.*, new-laid eggs, fresh eggs, and eggs. It appears that there are, for all practical purposes, three kinds of cocoa furnished to the consumer, viz., pure cocoa, concentrated cocoa, and prepared cocoa, and in years gone by, when the adulteration of this commodity was practised to no small extent by the addition of chicory, oxide of iron, chalk, sulphate of lime. and even brick-dust, this witticism might not unreasonably have been adapted to cocoa, but nowadays it would, there is every reason to believe, be wholly unmerited. Pure cocoa comprises the unground cocoa nib. Concentrated cocoa, or cocoa essence, is ground cocoa minus the greater quantity of the

oil or butter extracted in the manner already described, and prepared cocoa is cocoa mixed with sugar, arrowroot, sago, &c., and various flavourings.

You will recollect that we saw and left pure cocoa as a finished article in the shape of cocoa nibs after their summary treatment by the winnowing machine. We now, therefore, have only remaining with us such of the ground nibs as are destined to become concentrated cocoa and prepared cocoa. These ground nibs were, when we temporarily left them to follow the chocolate process, in a state of oleaginous paste. This is now run into canvas bags, which are placed in steam or gas-heated steel cylinders about a foot in diameter, perforated at the sides. Hydraulic pressure of some-

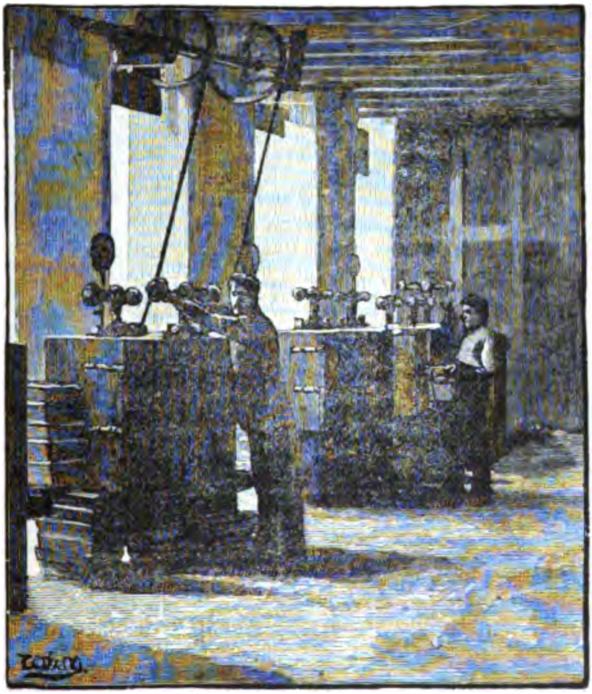


Fig. 4.—Hydraulic Presses for Extracting Cocoa Butter from Concentrated Cocoa.

thing like 1200 lbs. to the square inch induces the oil, to which condition the fat has, as a matter of course, been reduced, to escape through the perforated sides of the cylinder and run into trays, where it solidifies into cocoa butter, now of a dark-brown colour,

but which presently cools into solid white blocks. This commodity is used again in grinding some of the cheaper kinds of prepared cocoas, and also affords a bye-product, being sold to chemists, to soap manufacturers, who use it in the preparation of superior kinds of soap, and to metal-workers, who utilise it as a lubricant and as a combustible for the blow-pipe flame. It is further widely used to lubricate machinery that oil might contaminate, of which the process under consideration in an excellent example. The residue, now a dry mass, having been released from the cylinders is again subjected to a grinding process effected with different degrees of thoroughness according to the character of the cocoa, and is then passed through fine sieves of about 3000 holes to the

Fig. 5.—Mixing Pan.

square inch, and finally dressed by machines of wire or texture much on the principle of those used in the corresponding process effected in flour mills. Thus is constituted the concentrated cocoa of commerce which, it will be observed, is free from sugar and other adulterations.

The prepared cocoa now pursues its destiny alone. In the grinding process subsequent to the extraction of the oil, arrowroot, sago, sugar, and numerous flavourings are added in quantities varying in accordance with the quality required, this class of cocoa

being made up under many cognomens, such as pearl, caracas, homœopathic, &c., &c., in reality differing only in quality, and not at all in process of manufacture.

The final manipulation of cocoa is that of weighing and packing, which is primarily accomplished by hand, although there are small machines fed either manually or by shutes from hoppers, of remarkable ingenuity, by which packets varying in size are filled. By a clever contrivance the exact amount of cocoa required is run into the packet, thus saving the laborious method generally in vogue, and which it will doubtless, ere long, entirely supersede. Supplementing this department is the export packing room, where the packets of cocoa and chocolate are wrapped in tinfoil and placed in zinc or tin-lined boxes for despatch abroad. Straw does not appear to be used to any very great extent in these rooms, but a considerable quantity of paper shavings and such like packing material is required, and care should be taken that it is kept in bins, more especially as the soldering of the metal linings of the boxes involves the presence of numerous small stoves for heating the irons. Branding of boxes is seldom done, the marking being effected by means of inked blocks.

There are, as will be readily understood, different treatments of the numerous kinds of bean, but these processes do not vary in any essential manner, and it is not only impossible but unnecessary for me to attempt to detail them, consequently I have merely endeavoured to describe to you in a general and, as far as I know how, concise manner the *modus operandi* adopted in the preparation of chocolate and cocoa in the widest sense those terms convey to the mind. If I have made myself sufficiently clear to have enabled you to follow what I fear is, at the best, but a somewhat disjointed account of the process, you will have gathered that it confronts the surveyor endowed with the most ordinary intelligence with no insurmountable difficulties. He must not, however, imagine his task to be over here. He has, as a matter of fact, only reached the point which I will, for simplicity's sake, call the end of Part I. of his survey.

PART II.

We now pass into what may be termed the fancy department of this trade, which embraces the production of chocolate creams and multifarious kinds of fancy chocolates and sweetmeats. The

ante-rooms of this department are (1) the fruit room, containing very often a considerable number of pulping and stoning machines, and (2) the sugar-boiling room, wherein are long rows of boilers heated by steam. From these the sugar is emptied in a boiling

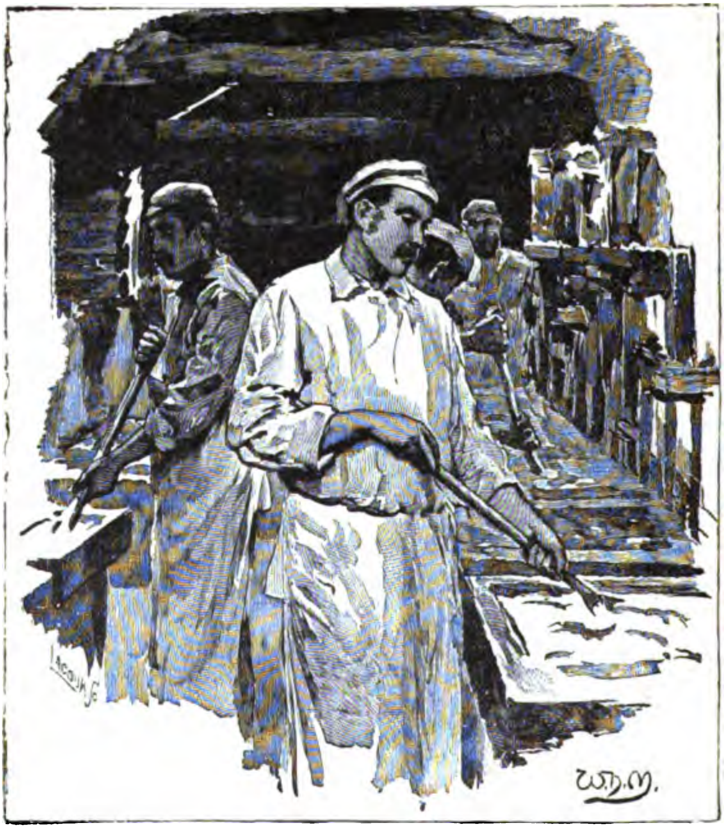


Fig. 6.—Stirring the Sugar Cream.

condition into large stone troughs, and is there, after being flavoured, beaten and stirred with a wooden utensil I can only describe as a spade until it assumes a cream-like compound. Stimulated, doubtless, by the labour-saving instinct so strongly developed in the twentieth-century biped, human ingenuity has here again contrived a machine which effects this process in a far quicker and equally efficacious manner, and which inevitably will ultimately oust the more antiquated method. In these machines,

which have an attendant steam-heated boiler, and are known as the Eureka plant, the sugar is first reduced by steam to a liquid condition, and then passed into large cylinders containing revolving beaters, which transform the sugar into the same workable paste. In this condition it is transferred to moulds composed of starch or cornflour. After being allowed to crystalise the moulded cream is tipped into a machine which brushes away the flour, and thus cleansed it is taken to the coating department, where scores of girls, with trays of thin chocolate kept in that condition by a gentle warmth applied to the trays by gas-jets, steam, or electricity, dip the moulded cream therein by hand. This seems to be a toilsome operation, but no machine ensuring a sufficiently uniform covering of the cream has yet been placed on the market. I only know of one firm who appear to have solved the problem, and there the machines are patented and confined to a private compartment. There are, however, covering machines for cubes and such-like larger shapes of sweetmeat, and no doubt some mechanical contrivance will eventually become general in the cream-covering process. It is, of course, only necessary to diversify the pattern and size of the moulds and to vary the flavourings to produce innumerable forms of sweetmeats, but, excepting those of a hard, or, as it is known in the trade, a "rock," character, no deviation in the process calls for description. With regard to the exception referred to, sugar boiled by fire heat, owing to the burnt taste and darker colour so imparted to it, is more suitable for hard confectionery than when boiled by steam. Hence fire-heated boilers are required, and entail the most formidable process of any which is carried on in this department. It should, if practicable, be confined to an isolated building or to a compartment as far as possible fire-proof and cut off by iron doors.

At different stages of the three operations which I have attempted to describe, *i.e.*, the manufacture of chocolate, of cocoa, and of fancy goods, warming ovens and drying closets are required, the former to maintain the chocolate, cocoa, or sweetmeat, as the case may be, in a soft or moist condition, pending its transference from one set of machinery to another, and the latter for drying manufactured or partly manufactured stock. Excepting possibly those in connection with the hard sweetmeat process in the fancy departments, the heat attained in these rooms does not generally exceed 100 to 120 degrees, and will often be found lower than this, but I have seen the temperature standing at 200

degrees. Even when the former condition prevails, and when the heat is furnished by hot water or low-pressure steam, I would still recommend that these compartments be as far as possible of fire-proof construction. Nevertheless, I hardly think they should be placed in the same category as the drying rooms found in confectionery works, where, as you know, the heat required is often much greater. The utilisation of the flues of fire-heated sugar boilers or furnaces for warming these ovens and closets, which is sometimes resorted to for economy's sake, is very objectionable and should be prohibited. Again, at other points of the process, cooling rooms will be encountered. These, in my opinion, although *prima facie* so innocent, involve an equally important feature, inasmuch as, in addition to the floor-to-floor communications which the numerous air shafts effect in a storied factory, they further denote the presence on the works of a refrigerating plant, possibly entailing much of the hazard which is met with in risks rated under the Cold Storage Warehouses Tariff. At anyrate the method of refrigeration in vogue, the nature of the material by which the cold rooms are insulated, and the question of circulation, of air by power will need investigation. It is, however, only fair to point out here again that these rooms are required for cooling purposes only, not for freezing, and that, consequently, only a low-pressure system of refrigeration is necessary. This notwithstanding, we have at least one instance in recent years where a refrigerating plant of this description was responsible for a fire attended with most disastrous results. I refer to the outbreak which happened at Messrs. Kieller's Confectionery Works in Dundee in the year 1900. There was a small refrigerating plant on the ammonia system in connection with the chocolate-making department of that concern. An explosion occurred, and a fire ensued which was not controlled until damage to the extent of about £50,000 had been done. It was suggested that the condenser piping had oxidised externally, and consequently decaying, had burst, thus rupturing some gas-piping which was in close proximity.

PART III.

Subsidiary Processes. Were we here able to write "Finis" to our task, the fire risk of a chocolate works would be comparatively simple, but the growth of this industry has compelled extension in directions doubtless never contemplated

at the outset, and to the consideration of which we will devote Part III. of this paper.

It would, of course, be impracticable in the time at my disposal to enter into a minute description of each of these subsidiary departmental processes, but, on the other hand, it would be impossible to omit a passing reference thereto.

The wooden case and box making department is perhaps that involving the most serious element of hazard, and we will therefore take it first in rotation. Here one may find all the features of a saw mill of no light character, in the shape of power-driven circular and band saws, planing and numerous other machines, to say nothing of wood-working benches. There are also here automatic nailing machines, which are yet another remarkable instance of labour-saving mechanism. When one realises that some of the larger firms turn out over 120,000 boxes per week, an idea of the magnitude of this department is arrived at. The storage of these boxes is another point which must not be overlooked, as they would naturally afford additional fuel to an outbreak of fire; and, of course, the question of artificial drying thereof is one of the greatest importance.

The manufacture of cardboard boxes and of paper bags is also often a very extensive process, involving the presence of no small amount of machinery, and the artificial drying arrangements here again need watching. A point to be specially borne in mind in this connection is the fact that at certain seasons of the year, more particularly prior to Christmas, this department is worked at extremely high pressure, and care should be taken that no makeshift drying arrangements are then resorted to.

The tin and zinc lined cases seen in the export packing room of the works will have prepared the surveyor for the tinman's shop, with all the stoves, plant, and appliances requisite in the tinsmith's trade. In addition to the case linings and tin boxes wherein the chocolate and cocoa is packed, moulds, used in the process of manufacture, are not seldom made.

Another metal-working department is that of the engineer, which, in a large factory, is no small affair. Indeed, many a well-established engineering firm might with small blame envy the well-equipped workshops of these huge undertakings, embracing as they not infrequently do the electrical machinery whereby the current requisite for lighting the premises and working more or less of the machinery is generated. Without

doubt they cannot be overlooked by the insurance man when computing the hazard of the risk on which he is engaged.

Then probably painters', glaziers', and plumbers' workshops will call for more than casual attention, and even these do not compass the entire occupations in which the hands of a chocolate and cocoa factory may be engaged, but they comprise the more important of them, and suffice to demonstrate the diverse character of the fire risk which is to be reckoned with in these works. They further give some idea of the far-reaching influence which the industry has on the commercial world.

It is, of course, not necessary for me to mention that the survey will be incomplete until a visit has been paid to the engine and boiler houses, but perhaps I may be excused for reminding you that it is desirable that the surveyor should satisfy himself that no drying of boxes, or of timber used in their preparation, be done in the boiler-house, especially when no recognised drying room exists in connection with the box-making departments.

Again, whilst I would not presume to detain you on the question of construction from its ordinary standpoint, I would nevertheless emphasise (1) the serious feature which may exist, by reason of the weight which the vast and heavy character of the machinery entails, should an undue proportion thereof be contained in upper floors of storied factories; (2) the numerous floor piercings in said storied factories entailed by the shutes from and to the various machines, and by the air shafts in connection with the cold rooms, all of course calculated to accelerate a spread of fire, and very gravely militate against all attempts, in the way of stone staircases, brick-lined and metal-doored hoists, &c., to construct an effectively fireproof building; (3) the desirability of having in a works of this description, where sugar enters so largely into the process, and where the raw commodity itself is of a greasy description, incombustible floors. More especially does this apply to those compartments wherein the cocoa butter is expressed, the floorings of which may otherwise easily become saturated with oil.

Here it may not be superfluous to make a passing note of the fact that as the sweepings of the majority of the compartment contain much sugary and greasy matter they should not be allowed to be brushed away behind or underneath steam pipes, nor to be kept in large quantities for any lengthy period. I think you will allow that I have some excuse for making this very obvious and elementary comment when I tell you that in one

large factory I went over I was informed, in a somewhat matter-of-fact manner, that one or two small outbreaks of fire had occurred through spontaneous combustion of refuse. You will doubtless agree that the knowledge of one such instance is ample justification for the surveyor insisting on the frequent and regular removal of all refuse and waste outside the buildings, and, while I cannot testify to an unanimity of opinion of all manufacturers as to danger on this score, I am glad to say that in each instance, when I made inquiry whether this method of dealing with refuse was in vogue, I received an assurance in the affirmative.

The subject of extinguishing appliances, as applied to this class of risk, presents at least one somewhat prominent feature. Automatic sprinklers and other appliances should of course entitle the insured to a considerable discount, more especially when the factory comprises shed buildings, or where, if a storied one, the floors are fireproof. Not only, however, would I express a doubt that many floors of so-called fireproof construction would stand a water test when the concrete has been laid down one or two years, but I would ask you to recall my remarks as to floor-to-floor communications made under the paragraph referring to construction. As, therefore, it must not be forgotten that a large quantity of water would probably do almost as much damage to a stock such as has to be dealt with in chocolate and cocoa works as the fire itself (even the raw bean, it must be remembered, is of a soft description), I hardly think this method of protection should command so large a reduction as in the case of some other classes of risks—corn mills, for instance—where a good salvage may be reasonably looked for on a water-damaged stock. It would certainly be an advantage if a contrivance could be devised which would admit of the water draining away from the storey, or stories, on which the sprinkler or hose plays before it has time to percolate through the concrete floors (I am now speaking of a factory so built, and not one of ordinary construction, wherein, of course, the idea would be of little or no value). A remedy of this kind has been recommended, and reference thereto will be found in a paper upon "Fireproof Buildings and Fire-resisting Floors," read before the Manchester Insurance Institute in 1902. It was there described as comprising an arrangement of scuppers, which are metal spouts passing through the outer walls at the floor level and fitted with metal lids opening outwards only. Before the water can accumulate on the floors it drains away through these

scuppers, and escapes down the outside of the building, thus preventing much water damage. The writer very properly goes on to point out that care must be taken that the metal lids are well fitted, so that cold air cannot enter the rooms, and that the said lids would require periodical examination to ascertain that they are not jammed.

The question of salvage briefly alluded to in the last paragraph cannot be thus summarily dismissed. Bearing in mind the large percentage of fat and butter which the cacoa berry contains, it must of necessity, as I have before stated, be susceptible to smoke damage. On the other hand, the fact that the husk is usable in cattle food would lead one to anticipate that a fair market should be found among provender millers for the damaged bean. With regard to the stock manufactured and in process of manufacture, however, there could, with a commodity of this kind, with which delicacy of flavour is one of the chief aims, be but little hope of even a fair salvage. It would undoubtedly be more or less tainted, and it is within our local experience that strong and successful opposition was offered by a firm to any produce of their manufacture which had in the very slightest degree become affected by smoke being sold even as damaged stock, on the ground that their trade would be prejudiced were deteriorated goods placed on the market by the Offices. This objection extended to all fancy boxes which had been in the least soiled or spotted by water. Upon the reasonableness of this contention, or upon the somewhat delicate question as to whether one class of manufacturer should receive more lenient treatment in this respect than another, I do not propose to here dilate, but I have thought it well to place the occurrence on record, the more so that inquiries I have made have elicited the information that our brethren in the north have encountered a similar objection when endeavouring to dispose of this class of salvage.

I should like to have been in a position to have placed before you statistics as to premiums derivable from, and loss ratios of, this trade, but it is not infrequently a difficult matter to acquire reliable data as to the experience of the Offices with regard to some classes of risk, more particularly, I think, those upon which no tariff rating has been formulated, and I have found it to be impracticable in the case of chocolate and cocoa works. I believe, however, they are generally admitted to be profitable, and there are one or two reasons why this is not surprising. In the first

place, they are all, or at least nearly all, in a flourishing financial condition. As to whether this is due to the fact that the industry is a protected one I should not like here to hazard an opinion. In any event this satisfactory state of things enables a firm to take many precautions for fire protection which, were the strictest economy essential, would be disregarded, and also admits of liberal treatment of, and consequent happy relations with, the employee—the latter a most desirable feature. Then, again, the bulk of this trade in Great Britain seems to be in the hands of Quakers. Messrs. Fry & Sons, Cadbury & Co., and Rowntree & Co., for instance, all belong to this denomination—a body that is, as you are aware, noted for its cleanliness, which, of course, must have effect on the physical nature of the risk, and for its probity, which naturally has its favourable bearing on the moral hazard.

And now, gentlemen, if you will spare me a moment longer, I would like to briefly epitomise, and so to emphasise, those points at which the fire hazard of a chocolate and cocoa works may be looked for, and also those which require to be carefully considered before the precise character of the risk can be adequately computed. They are, I think, as follows:—

(1) The Roasting and subsequent Cooling Processes.
(2) The Oil Expressing Room.
(3) The Packing Department.
(4) Sugar-reducing Room.
(5) Sugar-drying Rooms.
(6) Sugar-boiling Rooms, particularly those where the process is effected by fire heat.
(7) Warming Ovens and Drying Closets.
(8) Cooling Rooms and Refrigerating Plant.
(9) Wood Case and Box Making Department.
(10) Cardboard Box and Paper Bag Making Department.
(11) Engineer's Workshop, including Electrical Generating Plant.
(12) Box-drying over the Boiler-house.
(13) Weight of Machinery on the upper floors.
(14) Floor Piercings by Shutes, Air Shafts, Hoists, &c.
(15) The cleaning up and disposal, temporary and permanent, of refuse.

I am not, I would here again remind you, presuming to detain you with reference to those features which are common to all

classes of risks, such as lighting, heating, external hazard, &c., &c. These even the youngest of my brethren will be able to supply for themselves, and I doubt not that many of those amongst you who have from time to time had opportunities of surveying works of this description will be able to suggest further salient points which I may have overlooked.

Before closing I would like to express my sincere appreciation of the manner in which various firms and individuals most kindly afforded me all information and assistance in their power, and would specially mention your fellow-townsmen, Messrs. Fry & Son, and Messrs. Cadbury & Co., of Bourneville.

THE VALUATION AND INSURANCE OF PATTERNS, MODELS, MOULDS, DESIGNS, DRAWINGS, DAMASK CARDS, TEXTILE PRINTERS' BLOCKS AND ENGRAVED ROLLERS, AND SUCH LIKE.

By HARFORD H. MONTGOMERY, Assessor, Belfast.

A Paper read before the Insurance Institute of Dublin, 15th February, 1905.

THE subject of this paper is remarkable in at least two respects:—

1st—In the apparently entire absence of literature dealing with it.

2nd—In the great divergence of opinion existing thereon.

As regards the first, although I have made inquiries personally, and extensive inquiry has kindly been made on my behalf all over the three kingdoms, I have been unable to obtain the smallest scrap in print or manuscript on the subject. The nearest approach to anything of the kind, I believe, consists of a paragraph or two in one or two lectures dealing with Policy Drafting, confined, I understand, to the question of a limit upon any one pattern, model, mould, design, &c.

Upon this point I may just mention that considerable doubt exists as to what is actually intended or meant by the expression "any one pattern." Some contend that "one piece" is meant, others that "one set" is intended. Even apart from steam engines and large machines, which obviously require a large number of pieces to complete the set, many small parts or objects require two or more pieces, which may be used in conjunction or separately when preparations for casting are being made. It would be well, therefore, to define more clearly what is intended.

The cost of engineers' patterns especially varies so greatly that the high limits usually fixed give little protection, as a rule, to insurers, but it is scarcely practicable as yet to subdivide pattern insurances so as to cover patterns below, say, £5 or £10 in value,

and patterns above such sums, separately. One set sometimes costs £1200 or more.

The divergence of opinion as to the value, and more especially the insurable value, of patterns, models, moulds, &c., is so great and has existed so long, frequently causing serious inconvenience and dissatisfaction to both insurers and insured, that it is remarkable that effort has not been made long ago to formulate some practicable working basis or principle which might be more or less acceptable to all concerned.

The purpose of this paper is chiefly to initiate discussion with that object in view.

I submit with diffidence some scales or tables for valuation, based not alone on my own experience or judgment, but after submission to various firms in the various branches of trade to which they belong, as well as to a number of consulting engineers, expert valuers, &c.

Where the views kindly given were widely divergent, I have either given the opinion of the decided majority of those whom I consulted, or if the minority was of importance I have given the views of both in tabular form.

To avoid needless repetition of the somewhat lengthy title of this paper, unless where the contrary be expressed, the term "Patterns" will hereinafter include the whole range of the title.

Principle of Valuation.

For Fire Insurance purposes my own opinion is that the proper principle or basis of valuation, in the case of going and prosperous concerns, should be the fair value that would be given by a prudent partner coming into a concern, or that would be given upon an amalgamation of two or more prosperous concerns.

I submit that this principle constitutes the true "market value" contemplated by the legal authorities as the proper principle or basis for compensation in the event of loss.

A decided majority of those whom I have consulted agree with this view or something very near it, and say that their patterns are valued at this or a lower value in their books, and, further, that they would object to any higher value being put upon them for average purposes in the event of loss, which latter is a very important point to be noted in discussing the whole question.

A minority, however, including large, powerful, and respectable firms, contest the foregoing view, and put forward a variety of bases of valuation, amongst which may be mentioned :—

1. Actual cost price of reproducing all patterns destroyed by fire. On more than one occasion insured have claimed for loss on this basis, but valued unburnt patterns for average at about one-tenth of it. It is needless to say that the same basis of valuation must be employed both for loss and average.

2. Actual cost price of reproducing all patterns destroyed by fire, but deducting for obsolete patterns and depreciation for use, wear and tear. In one case 10 per cent. was suggested as ample to cover use, wear, and tear on a range of engineers' wooden patterns, running up to thirty years old.

3. The value at which the patterns stand in the books of the firm at the date of the fire. Provided there was some agreed basis of valuation there would be no objection probably to this last method, but when it is mentioned that the value of the patterns in one concern stood in the books at £42,000, or somewhere near original cost of patterns, made during a period of over 40 years, and over seven-eighths of which were obsolete, whereas if valued on the basis of other large concerns the value on the books would have been from £3000 to £5000 at utmost, it will be obvious that "book values" cannot at present be recommended as a universal basis for valuation.

4. Original cost of construction, less reasonable depreciation for wear, tear, and decay, but irrespective of obsoleteness. An eminent King's Counsel has given an opinion that insured are entitled to this method of valuation under an ordinary policy. This opinion will be referred to later.

Counsel in this case appears to be quite unacquainted with the position of patterns and the vast difference between their value in relation to cost and that of other property. Valuation of patterns based upon this opinion would be absolutely impracticable.

Whilst patterns differ vastly in points of material of which they are constructed, methods and cost of construction, manufactures or trades in which they are used, the great majority have one feature in common, viz., the uncertainty of the "chances of recall" or reuse. It is this uncertainty which forms the crux of the question.

The chances of reuse vary greatly in different trades, and even in different branches of the same trade, more especially in foundries.

It is, therefore, absolutely necessary to attempt some sort of classification, and deal with each class on its own merits.

Another feature common to many classes, and more especially to engineers' wooden models, is the fact that the patterns which are the most valuable are those which are the most frequently in use, and become the sooner useless owing to wear, when fresh models must be made. For example, engineers' wooden models in constant use become worn out in from one to three years.

It is obvious that in valuing for Fire Insurance purposes at all events "goodwill" should be excluded, as "goodwill" is excluded from the scope of Fire Insurance in this country.

It is only possible within the compass of this paper to deal with a very few of the many branches of the question, amongst which may be enumerated:—

TRADE CLASSES.

Class.	*Sections.*
I. Textile Printers'.	A. Blocks.
	B. Perforated Paper Patterns.
	C. Engraved Rollers.
	D. Sample Pattern or Design Books.
II. Damask Manufacturers'.	E. Original Drawings and "Paints."
	F. Cut Cards (for Jacquard Machines).
III. Foundry or Mechanical Engineers'.	G. Original Drawings, Designs, or Plans.
	H. Models.
	H 1. of wood.
	H 2. of metal.

IV. Brick, Tile, and Terra Cotta Works' Moulds or Models.
V. Shirt and Collar Factory Patterns.
VI. Printers', and Lithographers' Stones, Rollers, Plates, Dies, and Cutters.
VII. Publishers' Stereos and Blocks.

Classes I., II., and III. only are dealt with in this paper.

CLASS I.

Textile Printers' Blocks, Rollers, and Pattern Books.

Up till 1892 in Ireland the same difference of opinion and uncertainty prevailed as regards the values of patterns belonging to this particular branch of manufacture as in others.

In 1892 a fire occurred by which nearly the whole of the blocks of a respectable firm were destroyed. Several sets of pattern

books existed after the fire, by which it was possible to ascertain closely the original cost of these blocks, or, more strictly speaking, the cost of reproduction, and the books also indicated to a large extent the date of production of most of the designs.

The cost originally, and also to reproduce the whole, undoubtedly exceeded £10,000; insured claimed as value at time of fire £4434. The whole question of the "chances of recall" or reuse was at once raised and discussed at great length.

Acting on behalf of the Insurance Offices, I valued the blocks and perforated patterns on the following basis:—

TABLE 1.

For Blocks made within—	
12 months of fire	Cost of remaking.
2 years but over 12 months	50% of cost.
10 years but over 2 years	25% of cost.
For Blocks older	nil.
For Embroidery Blocks	50% of cost.
For Perforated Paper Working Patterns	1/2¼d. each.

This resulted in practically £1400 in all, which was offered to insured, but rejected, the loss being subsequently referred to a trade arbitration, the Court being composed of gentlemen occupying the highest position in the trade and thoroughly and practically acquainted with the question in all its details.

An award of £1397 resulted. Since then the above scale has been adopted in the settlement of other losses, and also for valuations made for partnership, amalgamation, bookkeeping, and insurance of similar property as part of going and prosperous concerns in Ireland, and, so far as I am aware, it has not been contested again. The ever-increasing demand for novelties or new designs, and the consequent rejection of "old styles," as patterns even only one or two seasons old are now denominated, has probably rendered the above scale too high by this time, and I believe the following would be a fairer basis, viewed from all sides:—

TABLE 2.

For Blocks made within—	
1 season or, say, 6 months	Cost of remaking.
12 months but over 6 months	50 % of cost.
2 years but over 12 months	33⅓% of cost.
3 years but over 2 years	25 % of cost.
4 years but over 3 years	20 % of cost.

10 years but over 4 years	12½% of cost.
Over 10 years	nil.
For Embroidery Blocks up to 1 year old	Cost of remaking.
Older as above.	
For Perforated Paper Working Patterns up to 1 year old, including design	9d. to 1/- each.
Do. 1 to 3 years old	6d. each.
Older	nil.

There is usually some value in blocks over 10 years old, but the trade say it is so small that it need not be reckoned, and the foregoing scales are sufficient to cover it in the event of general destruction.

For engraved rollers for textile printing the following is considered a fair value:—

TABLE 3.

1st. Value of the rollers on basis of cost before being engraved, to which is to be added

2nd. For Engraving.

A. STANDARD PATTERNS, such as dots, stripes, &c.

If engraved within—

12 months	Cost of engraving.
2 years but over 12 months	75 % of cost.
3 years but over 2 years	50 % of cost.
4 years but over 3 years	33⅓% of cost.
5 years but over 4 years	25 % of cost.
6 years but over 5 years	20 % of cost.
10 years but over 6 years	10 % of cost.
If engraved over 10 years	nil.

TABLE 3x.

Mr. Robert Thompson, of Messrs. Lindsay, Thompson, & Co., Ltd., considers the following scale now ample:—

1st year	Cost of engraving.
2nd year	50 % of cost.
3rd year	25 % of cost.
4th year	12½% of cost.
Older	nil.

Patterns engraved on copper, which is the usual material employed, if in frequent use would require recutting before 10 years had expired, often after 5 or 6 years.

B. Fancy Patterns.

If engraved within—	
12 months	Cost of engraving.
2 years but over 1 year	50% of cost.
5 years but over 2 years	25% of cost.
10 years but over 5 years	10% of cost.
If engraved over 10 years	nil.

For pattern books the fair value on basis of cost of getting up runs from £1 to about £5 per book of several hundred patterns, according to the number and size of the patterns, material used in the cover, &c. This, of course, assumes the blocks or rollers to be engraved or made.

Class II.

Damask Patterns, including Original Designs, "Paints," and Cut Cards.

About the time of the arbitration referred to as to the value of blocks, &c., or shortly after, I was engaged upon the valuation of several large damask factories for partnership and other purposes, where the fair going concern values were required.

The success of the experiment with a scale for textile printers blocks, &c., induced me to submit a scale to two or three leading manufacturers of linen, cotton, and union power-loom and linen hand-loom damasks.

The following scale was then recommended, and I have used it since for about a dozen similar valuations with the approval of those concerned. I have several times discussed the rates of depreciation with the view to ascertain if amendment were desirable, but those concerned finally preferred the scale as it originally stood.

There has been no serious fire loss, so far as I am aware, during the past 15 years in Ireland on damask patterns, but I have adjusted a few small ones on this scale basis.

Table 4.

Damask Designs, Original Drawings.

For new designs for which "paints" have not been made	Cost.
After "paints" have been prepared	nil.

For "Paints."

Prior to cards being cut	Cost.
After a set of cards has been cut	nil.

It is considered that the undernoted scale for Cards is sufficient to cover any "Paints" which would have to be re-done.

For Damask Cards.

Made within—	
2 years	Cost.
4 years but over 2 years	75 % of cost.
6 years but over 4 years	50 % of cost.
8 years but over 6 years	25 % of cost.
15 years but over 8 years	12½% of cost.
Older	nil.

CLASS III.

Foundry or Mechanical Engineers' Models or Patterns.

By far the largest and most costly class of patterns come under this heading, and, so far as my experience goes, it is certainly the most difficult to deal with or for which to formulate any generally acceptable basis for valuation. In addition, this class would require the time and space of at least two papers to deal with it at all adequately or exhaustively.

This class itself is subdivided into two great divisions, viz., 1st, Wooden Models; 2nd, Metal Models.

Metal models are produced, as a rule, only where a large number of castings are likely to be required, and the model will therefore be subject to frequent use, which would soon wear out a wooden model. A wooden model must, however, invariably be first made from which the metal models, one or more, as required, are cast. When a metal model has been obtained, the wooden model usually becomes of little value comparatively.

Metal patterns may be destroyed or rendered useless by fire, in which case, if the wooden models exist, the cost of recasting is comparatively small. The question of the "chance of recall" again arises, however. The "chance of recall" varies greatly in different branches of the foundry business, and rates of depreciation vary accordingly.

The following list, I think, embraces most of the branches, viz.:—

Branch 1. Founders of Specialities.—Under this branch come patterns for such special work as stable fittings, stoves, fans,

heating apparatus, &c., including such firms as Musgrave & Co., Ltd., and Davidson & Co., Ltd., Sirocco Works, and firms chiefly engaged on patents or registered designs.

Branch 2. Mercantile Castings, including pulleys, gearing wheels (now usually turned out in quantity by a machine), agricultural and domestic implements and utensils.

Branch 3. Textile and General Mill Castings.

Branch 4. Light Castings, such as plumbers' use and for general builders' light work and other purposes.

Branch 5. General Jobbing Castings, including all kinds of odd work, for which frequently one casting only is required, and the model may or may not be used again.

Branch 6. Engine Castings, subdivided—

A. Special Engines.

B. Standards.

Before considering the question of scales for these various branches it will perhaps be convenient to mention some cases which have cropped up in actual practice.

Case No. 1.—A loss recently occurred in a foundry dealing chiefly with Branches 2, 3, and 5, that is to say, mercantile, textile, and general mill and general jobbing castings, by which the bulk of the wooden patterns and a considerable quantity of metal models were destroyed. Briefly stated, the facts were as follow :—

	Wooden.		Metal.
Insurance on patterns in Store "A" burnt	£1850	..	£600
Insurance on patterns in Store "B" unburnt	£400	..	,,
Value of patterns in Store "C" unburnt and not insured	£75	..	,,
Insurances subject to average.			
Limit on any one pattern, £20.			
Claim made by insured for loss in "A" ..	£1948	..	£616
Excluding salvage valued by them at ..	£50		
Showing value for average	£1998		

No one pattern was valued beyond the limit of £20. The Assessors for the insurers offered £1000 and £350.

The loss on Metal Patterns was agreed to at £350, subject to operation of average.

Subsequently, on special appeal by the insured, and on the ground of the uncertainty prevailing on the question, insurers offered £1400 "without prejudice." Insured offered to accept

£1500, without prejudice, but failing to agree the case was referred to arbitration, the two arbitrators and umpire being mechanical engineers of high standing.

At the arbitration the following evidence and particulars were offered on behalf of insured :—

The concern, originally established about 40 years ago, was floated in 1893 as a limited liability company amongst the then existing partners, all being members of the same family.

All the patterns in the concern were then valued by an eminent consulting engineer (a list of the patterns being made and valued separately) at some £2900, and they were taken in the balance sheet at £2850.

Witness No. 1, the same gentleman who made the valuation referred to, prepared the claim and was the chief witness for the insured.

Pattern books, showing the cost and date of each pattern, had only been kept for some fifteen months before the fire, and it was therefore impossible to say what the original cost of the wooden patterns in the claim amounted to.

A witness (No. 2) for insured estimated the cost at £2150 approximately, but this appears to have been too low, as two witnesses on the insurers' side estimated it at not less than £2700, and one of the claimants thought it might be as high as £5000.

Of the patterns in the claim £439 worth appeared in valuation, 1893, at then £524, showing a deduction of ten years' depreciation of £85. Insured stated that large quantities of obsolete patterns had frequently been destroyed, and claimed that all the patterns practically in burnt store were necessary, although £439 worth were at least ten years old, and some of these from 20 to 30 years old.

The outlay in the Pattern Shop during five years prior to the fire was as follows :—

	Wages paid Pattern Makers.	Timber.	Total.
1899 ..	£650 8 1	£177 8 11	£827 17 0
1900 ..	737 18 2	272 6 11	1010 5 1
1901 ..	745 3 3	281 5 0	1026 8 3
1902 ..	674 15 4	312 13 3	987 8 7
1903 ..	747 2 2	294 1 11	1041 4 1
	£3555 7 0	£1337 16 0	£4893 3 0

About twelve patternmakers were usually employed, including apprentices.

Witness No. 2 (manager for a large firm of engineers) valued the patterns at £1951 on the basis of cost, less about 10 per cent. for depreciation, but without adding "on cost" or establishment charges for rent, taxes, use of machinery, &c., which he considered to be about equal to 18 per cent. on wages.

He admitted having stated to the Assessor that the value on the principle laid down on page 92 would be less than half, or probably below £900.

The patterns of this witness's firm were insured for £15,000; cost was unknown, but was over double that amount. The principal of this firm stated that on the recent amalgamation with another firm (both being large and prosperous concerns) the value at which these patterns were taken was about £5000.

For the insurers it was proved that witness No. 1 had also valued the patterns of a similar concern in 1901 for partnership purposes (upon new partners coming in) at £2652, but that the price actually agreed upon between the partners was £600 for the same.

Witness No. 3 valued the burnt patterns at £750 as part of a going concern, and gave the following particulars regarding the patterns of his own firm, doing a similar business to the claimants:—Established about 35 years; patternmakers employed, including three apprentices, 10/15; wages, materials, and establishment charges on wooden patterns runs from £1200 to £1500 per annum; patterns taken into balance-sheet at considerably below £700; patterns are insured for practically £750 (actual figures being £1750, including £1000 machinery). The patterns had all recently been gone over, and the wooden patterns valued at £700. He would object decidedly to any greater valuation being put upon them for average. The original cost of those now stored and insured for £700 exceeded £6000. He was strongly of opinion that the claimants would never be called upon to remake the burnt patterns to the extent of £1000, and that no prudent outside man coming in as a partner, or another firm amalgamating, would give over £700 for them.

Witness No. 4 valued the burnt patterns at £925 as part of a prosperous going concern. He was confident claimants would not have to expend £1000 in remaking such of the burnt patterns as would be required again.

Witness No. 5 valued the burnt patterns at £1072 as part of a prosperous going concern, but did not believe an outside partner coming in would give so much for them. Witness's own firm had about the same number of wooden patterns stored as in the claim sheets, and insured for £880. They would object to any greater value being put upon them for average. He did not believe the claimants would ever have occasion to expend in remaking anything like £1000.

Witness No. 6 declined to value the burnt patterns, but gave evidence as to his own concern as follows:—Established about 40 years; average number of patternmakers, including apprentices, 8; expenditure on wages and materials only in pattern shop, about £500 per annum; average output of castings per week, 15 tons; patterns all over works, including metal patterns, are insured for £520, and appear in the balance-sheet at less; original cost of wood patterns in store would exceed £5000.

It was agreed by all the witnesses, and not disputed by anyone, that had the burnt patterns been put up for auction, or sold privately on break-up, the sum realised would not have exceeded £100.

Cases were proved or mentioned of break-up sales as follow:—

Case No. 2.—The patterns stood in the books at £42,000; insured for £10,000; and, including metal patterns, realised under £300.

Case No. 3.—Cost of patterns, including metal, exceeded £6000, and realised exactly £100.

Case No. 4.—Cost of patterns believed to exceed £7000, realised under £80.

Case No. 5.—Cost of patterns believed to exceed £5000, realised under £100. Latter were insured at the time for £1700.

Briefly, the award was in the form of a stated case for the Court to decide the true principle of valuation, and that should the Court decide the true principle to be—

	Award.		
1st. On basis of original cost of construction, less depreciation for wear, tear, decay, and obsoleteness, then the sum to be paid is ..	£1736	8	6
2nd. If on cost of reconstruction	1736	8	6
3rd. If on basis of sale value in open market ..	900	0	0
4th. If as part of plant of a going concern on conditions of re-adjustment of partnership or settlement of accounts between partners	1736	8	6
5th. If the decision of the Court be not taken ..	1736	8	6

On application to one of the arbitrators he explained verbally that No. 3 did not refer to break-up value, and that No. 4 referred to re-adjustment between the existing partners, having regard to the value at the flotation in 1893, and not to the price an outside partner now coming in would give. After referring to the umpire, he declined, however, to give any letter of explanation to this effect. Upon this the legal advisers of the Company advised payment of the £1736, as the Court would undoubtedly read No. 3 as referring to a break-up sale value, which the insurers did not contend to be the fair principle of valuation.

The opinion of a second eminent K.C. was taken on the subject. Briefly, the opinion was to the effect that the insured were entitled to the "cost of construction, less a fair and proper allowance for depreciation." "The question is not what the patterns and models were worth either to the insured or in the market, but what it would cost to replace them in the same condition of age and repair, &c., as they were in at the time of the fire. They may have been extremely valuable to the insured, or they may not have been worth anything either to insured or to anyone else, but this does not in any way effect the question of querist's liability on the policy." "Whether the patterns or models were worth thousands or worth nothing, the insured is entitled to the same amount necessary to replace the burnt articles by others as nearly as possible similar in every way."

From Case No 6 (below), where the result of the application of the opinion to another loss is given, it will be observed the opinion is quite untenable.

This opinion and the application referred to further indicate in a practical way the value of the Average Clause as a protection to insurers of patterns.

Case No. 6.—The following figures were given to me approximately, and refer to a loss which occurred some years ago on patterns chiefly of Class 6a, Special Engines :—Original cost of patterns exceeded £90,000; valued in the books at £7000; insured for, subject to average, £7000; loss, £1200.

The Assessor held that the patterns should be valued for average at £30,000. Insured refused to admit any valuation above £7000, and the loss was finally adjusted upon that basis.

If the patterns were valued upon the principle laid down by King's Counsel in Case No. 1 the result would have been :—Value of patterns for average, say, £60,000, allowing for depreciation for

age and wear only; insurance £7000; loss, £1200; Insurance Companies pay £140; insured lose, under average, £1060; if valued at £30,000, Insurance Companies pay £280; insured lose, under average, £920. Counsel apparently ignores the question of obsoleteness or the chances of recall. Insured would not merely be indemnified by the settlement of a loss on patterns upon his principle. The insured would be placed in a vastly better position by the payment of £30,000 or £40,000 under such circumstances or by proportionately smaller sums. Insurance Companies would scarcely view with equanimity the covering of patterns at all under such conditions. As it is, many Companies are averse to accepting large or even small amounts upon this class of property owing to the uncertainty as to its value and the difficulty of obtaining fair settlements.

Case No. 7.—A recent loss in England.—Original cost of patterns, over £12,000; insurances, £10,000; value in books of the firm at time of fire, £3953; claim, £10,000; loss adjusted at £4200.

This loss was about to be settled by arbitration, but on the day of the arbitrators' first meeting the insured, acting upon advice, agreed to except the above amount.

Case No. 8.—Valuation for transfer from an owner to a private limited liability company.—Mr. John Hepper, F.S.I., F.A.I., of Leeds, a past President of the Institute of Auctioneers, and a valuer of large practice and experience, has kindly supplied me with the following example of a method of valuation of models adopted by him, and which has been considered satisfactory in his district:—

Estimated value of models six years ago		£1000
Less depreciation, 50 per cent.		500
Present value		£500
Models made since, cost of wages	£1800	
cost of wood	840	
"On cost" or establishment charges	600	
	6)£3240	
Average outlay per annum	£540	
Of this sum £300 is for new models × by 6 = £1800, and £240 for repairs, alterations, &c., not taken in account in valuing.		
Value half price now		900
Add for Scott Wheels and Pulleys Models (a special item)		200
Plans and drawings		150
Value for Transfer		£1750

Conclusions. In respect to Class III., *i.e.*, Foundry or Mechanical Engineers' Models or Patterns, I submit the following conclusions may be safely arrived at, viz.:—

1st. That the present state of uncertainty, difference of opinion, want of basis of valuation, or recognised method of computing losses and values for average is undesirable, and calls for attention on the part of both insurers and insured.

2nd. That the matter is sufficiently serious and important for attention and action.

3rd. Generally, that depreciation from obsoleteness or want of "recall" is much greater than from age or decay only, as regards most, if not all the branches and sections.

Suggestions and Recommendations. I submit with diffidence, having due regard to the difficulties of the various questions involved, the following suggestions and recommendations for consideration:—

1st. That the Fire Offices endeavour to obtain an expression of opinion from some of the large associations or bodies concerned, such as those named below, viz.:—Federation of Engineering Employers, Institute of Mechanical Engineers, Chambers of Commerce in cities specially concerned in this branch of industry.

2nd. That on receipt of such opinions or failing to receive satisfactory opinions the Fire Offices should insure subject only to tables or scales, such as indicated or others to be adopted, as a maximum basis of valuation in the case of going and prosperous concerns, such policies not to be considered as "valued policies," but the onus of proof of value, &c., to rest upon the insured as hitherto.

In the cases of loss in silent or non-prosperous concerns the basis should be either break-up value or upon a much lower scale than that of going and prosperous concerns.

3rd. I recommend that there should be separate items or policies for patterns the total value of which is over £100.

At present "machinery" items frequently cover "patterns" also in very large sums.

4th. That insurances should only be effected where proper pattern books are kept, showing for each pattern or set of patterns—

A. Date of manufacture.
B. Cost of time and materials, and, say, 25% added for establishment charges, otherwise known as "on cost."
C. Number of times used, where practicable.
D. If metal patterns have been made such should be indicated.

5th. That cost should be confined to cost of remaking, which usually differs, and often materially, from original cost. The latter involves frequently considerable experimental work not necessary for reproduction, and also questions which amount to "consequential" loss.

6th. That the average clause be attached to all pattern insurances. The importance of this recommendation (No. 6) can scarcely be overstated from an insurer's point of view, and is probably sufficiently obvious from what has already been demonstrated.

7th. In case no agreement can be arrived at as to Tables for Class III. (Engineers and Foundries), insurers might adopt Harland & Wolff's scales (Tables X. and XI.) as a maximum basis of valuation for the whole class.

TABLE 5.—CLASS III.

Branch 1.—Specialities, such as Musgrave & Co., Ltd., and Sirocco Works.

Wooden Patterns.

Up to 1 year old	Cost of time, materials, and 20% establishment charges, exclusive of experimental work.
Up to 2 years old	80% of cost as above.
Up to 3 years old	60% of cost as above.
Up to 4 years old	40% of cost as above.
Up to 5 years old	30% of cost as above.
Up to 6 years old	20% of cost as above.
Up to 7 years old	10% of cost as above.
Older	nil.

NOTE.—Above is exactly as suggested by one firm, and seems a very low basis. They value in their books also at this rate.

Table 6.—Class III.

Branch 1.—Specialities—Standards.

1st year	Cost.
2nd year	90% of cost.
3rd year	80% of cost.
4th year	70% of cost.
5th year	60% of cost.
6th and 7th years	50% of cost.
8th and 9th years	40% of cost.
10th and 11th years	30% of cost.
12th and 13th years	20% of cost.
14th and 15th years	10% of cost.

Non-Standards.

1st year	Cost.	3rd year.. ..	40%
2nd year	60%	4th year.. ..	20%

Above to apply to both wood and metal patterns. Cost to include labour, materials, and 25 per cent. for establishment charges.

Table 7.—Class III.

(Branches 2, 3, and 5.)

Branch 2.—Merchantable Castings, including Pulleys, Gear Wheels, Agricultural and Domestic Implements and Utensils.

Branch 3.—Textile and General Mill Castings.

Branch 5.—General Jobbing Castings.

Wooden Patterns.

1st year	Cost.
2nd year	90% of cost.
3rd year	80% of cost.
4th year	70% of cost.
5th year	60% of cost.
6th and 7th years	50% of cost.
8th and 9th years	40% of cost.
10th and 11th years	30% of cost.
12th and 13th years	20% of cost.
14th and 15th years	10% of cost.

Cost to include labour, materials, and 25 per cent. for establishment charges.

Table 8.—Class III.

Branch 5.—General Jobbing Wooden Patterns.

1st year	Full cost.
2nd year	75% of cost.
3rd and 4th years	50% of cost.

5th, 6th, 7th, and 8th years ..	33⅓% of cost.
9th and 10th years	25% of cost.
11th year	10% of cost.
Older..	nil.

Cost to include labour, materials, and 25 per cent. "on cost."

TABLE 9.

Metal Patterns of same Branch.

	Value at
Up to 5 years	Average 75% cost of casting and finishing, plus metal.
Up to 10 years	„ 50% „
Up to 15 years	„ 33⅓% „
Up to 20 years	„ 20% „
Older	„ 10% „

Cost of wooden pattern not to be considered, as if burnt it would be paid for under Wooden Patterns.

TABLE 10.—CLASS III.

Branch 6, a and b.—Engineering Concerns.

Messrs. Harland & Wolff suggest the following as a fair basis of valuation:—

Branch 6a.—Wooden Patterns for Special Engines (usually stored outside and not under cover).

	Value.
Until first castings have been obtained, but within, say, two years of production of the pattern	Full cost.
During 1st and 2nd years after 1st casting ..	25% of cost.
During 3rd, 4th, and 5th years after 1st casting ..	15% of cost.
During 6th to 15th years after 1st casting ..	10% of cost.
Older	nil.

TABLE 11.

Branch 6b.—Standard Wooden Patterns.

1st year ..	Cost.	6th year ..	50% of cost.
2nd year ..	90% of cost.	7th year ..	40% of cost.
3rd year ..	80% of cost.	8th year ..	30% of cost.
4th year ..	70% of cost.	9th year .	20% of cost.
5th year ..	60% of cost.	10th year ..	10% of cost.
Older			nil.

Cost to include labour, materials, and 25 per cent. for establishment charges.

For metal patterns:—Cost of casting and finishing, including metal, without regard to cost of wooden patterns, as if burnt it would already be provided for under Wooden Pattern loss.

FLOORCLOTH AND LINOLEUM WORKS.

By WILLIAM WATSON.

A Paper read before the Insurance Institute of Edinburgh, 7th November, 1905.

In preparing a paper on Floorcloth and Linoleum Works, I have been confronted with several difficulties. It is a subject on which no text-book or other source of information is available to those not engaged in the business, and I shall, therefore, be unable to speak so freely, as I otherwise might have done, on details of manufacture. I am not in a position to offer you a historical paper, as a history of the industry has not yet been written, and I should not care to pose as a historian. It will, however, be my endeavour to describe the processes and hazards met with in these works, so far as they have come under my notice.

As you are aware, the industry is an important and a growing one, but it is controlled by a few large firms. The general principles of the machinery in use are practically identical, but the machines vary in many details. The descriptions of the machines will be of a general character, as diagrams are not available, there being no recognised makers of linoleum machinery, the manufacturers themselves usually supplying the designs, unless in those cases where an individual holds a patent. We will first deal with the manufacture of floorcloth.

Floorcloth.

Floorcloth consists of a canvas body of jute cloth, on both sides of which layers of paint are spread, and a pattern of various colours printed on the front. The process of spreading the paint on the canvas is known as trowelling, and is done either by hand trowels or by trowelling machines. The paint used in trowelling is of the consistency of thin plaster, and is composed of linseed oil, turpentine, and earthy pigments, whiting being largely used. The whiting is usually dried on steam-heated tables, and ground either in pan mills or

disintegrators. The machines used for paint grinding and mixing are of the usual type found in paint mills, viz., pan mills, roller mills, and mixing machines with stirrers. The linseed oil used in paint-making is brought to the works in casks, from which it is transferred to storage tanks. Before use in the paint mill, some of the oil is boiled by fire or steam heat, and when used for making quick-drying paints a quantity of naphtha is added.

Hand Trowelling.—The size of canvas used for hand trowelling varies from five to eight yards wide by twenty-five yards long, and must be free from all seams. The pieces of canvas are mounted on a series of upright wooden stretching frames, about thirty inches apart from each other, in lofty compartments which are known as trowelling chambers, and the back of the cloth is first coated with thin size to prevent the oil of the pigment from penetrating and rotting the canvas. When the size is thoroughly dry and pumiced, the first layer of paint is applied by hand trowels in the same way as a plasterer plasters the walls of a room, wooden stages being erected at convenient heights to enable the workmen to reach to every part of the canvas. If left unaided by artificial heat, the paint would take about fourteen days to dry, but, in order to accelerate the operation, the doors of the compartment are closed, and by means of hot air blast, or steam pipes, a temperature varying from 80° to 100° Fahrenheit is attained. When thoroughly dry a coat of red paint is applied in which boiled oil, without turpentine, is used to give a glossy surface. The cloth is then turned, and the face receives a series of coats, the drying operation taking place between each.

Machine Trowelling.—The cloth used for machine trowelling varies from two to four yards wide, two yards being the most common width. The cloth is first starched in a starching machine, and dried on steam-heated cylinders. The machine trowel consists of a series of rollers over which the cloth is passed. The paint is poured on the moving canvas by means of a ladle or other utensil, and in some cases small tanks are fixed on the tops of the machines to give the necessary supply. A large knife fixed immediately over one of the rollers spreads the paint evenly on the whole surface, and regulates the thickness. The cloth then passes direct into the drying-room, and is suspended by means of metal or wooden battens. This process is repeated as often as required, the number of coats varying according to the quality of the finished material. The cloth is thoroughly dried and sand-papered between

each trowelling coat, the temperature of the drying-room reaching to about 110° or 120° Fahrenheit. The drying-rooms are, as a rule, on a lower level than the trowelling-rooms, and the cloth is passed through openings in the concrete floors, which are protected by single metal shutters. After trowelling the cloth is ready for printing, but as the processes of printing and drying of printed materials are almost identical in floorcloth and linoleum factories, I shall defer treating same until I have given a description of the processes of manufacture of linoleum up to the printing stage.

Linoleum. Linoleum consists principally of ground cork, oxidised linseed oil, gums, and resin, all mixed together and made to adhere to canvas, backed with size and paint. The principal kinds of linoleum are (1) ordinary linoleum, (2) cork carpet, and (3) inlaid linoleum.

I propose in the first place to describe the processes which the raw material undergoes.

Cork.—The cork which is used for the manufacture of linoleum consists principally of cuttings from cork factories, and is mostly imported from Spain and Portugal. It reaches this country in pressed bales measuring about three feet by two feet by two feet (each bale weighing about one-and-a-half cwt.), and is usually stored in open sheds at the works until required in the cork mill. The bales are taken to the cork mill house, and, after the bands have been broken, by an axe or similar instrument, they are passed through a bale-opening machine, consisting of a revolving vertical iron plate studded with metal knobs, against which the bales are pressed and gradually fall to pieces. The dust is then shaken out of the cork by means of a sieve, and the cleaned material, after being passed over strong magnets, to which any stray pieces of metal adhere, is carried by elevators to the cork-breaking machines. Cork-breaking is sometimes done by disintegrators, but it is more commonly done by bone mills. These machines consist of two sets of toothed rollers, which reduce the material to small pieces. The cork on leaving the breaking machine is carried by a screw to elevators, and from thence by a travelling band to the hoppers in the grinding house, and passed to the grinding stones, by which it is reduced to dust. The stones are similar in every respect to those used in corn mills. After this process the ground cork is emptied into hoppers and carried by elevators to cork-dressing machines of the type found in corn mills, where any pieces which

have not been properly ground are separated, and again put through the stones. The dressed cork is then ready for use in the mixing-house.

I will now direct your attention to the making of cement, which consists of oxidised linseed oil mixed with resin and various gums. The following are the processes:—

(1) *Oil Oxidising.*—Linseed oil is the principal oil used in linoleum factories, and is brought to the works in barrels, from which it is emptied into tanks. Before being oxidised the oil undergoes a process of boiling by fire heat, the pans being enclosed and fitted with stirrers. The aim of all processes of oxidising is to get the oil to take up oxygen from the air to solidify it as quickly as possible. In the first or oldest process thin cotton cloth, known as scrim cloth, about two yards wide, is suspended from iron rods about two inches from each other in the oxidising sheds, which are buildings of one storey, about forty to fifty feet long by fifteen feet wide. In each shed there will be suspended at one time from 300 to 500 sheets of scrim cloth. Oil is sprayed on these every morning by a spraying machine, which is worked by hand or power and runs backwards and forwards, from one end of the building to the other, on rails fixed immediately over the cloth, the oil being allowed to run slowly out of the machine. Some of the oil is caught by the cloth, the remainder falling into concrete troughs and pumped back to the oil tanks. Steam heat is then applied to harden the oil on the cloth, and the process is repeated daily until the skins have become about a half inch thick, the time being from three to four months, after which they are cut into pieces and removed to the cement-making house. (2) Another method of oxidising consists of blowing air into the oil which is placed in steam-jacketted pans. This process, like the first, is very simple, but much quicker. The oxidised oil, in this case, when ready is in masses, and not skins, as in the first instance. (3) There is another process which is the latest patent process, and the principle here appears to be the constant circulation of the oil, which is kept exposed to the air as much as possible in thin layers, the circulation being maintained by pumps. The oil is afterwards finished in a similar manner to the second described method.

Gum Grinding and Cement Making.—The gums are ground in cone mills, and, together with the oxidised oil (which is ground to pulp between metal rollers) and resin, are placed in steam-

jacketted pans, fitted with stirrers, and boiled. The resulting material is the cement, and when ready it is run out of the pans and passed through rollers into shallow tins to cool. Thereafter it is stored until required in the mixing-house.

Mixing.—In the mixing-house the cement is placed on steam-heated tables to soften a little, and, together with ground cork and colouring materials, is passed into mixing machines. A small quantity of ground scrap is also added.

I may here explain that it is necessary to trim the edges of linoleum after it is manufactured, and to avoid waste the cuttings are ground to small pieces and utilised in the manufacture of fresh linoleum.

Scrap grinding is done usually by roller machines, which are steam-heated. Sometimes two machines are used, one to soften the scrap and the other to complete the grinding. The most modern machine, which consists of a revolving shaft fitted with blunt knives of various sizes, and is steam-heated, completely grinds the scrap. The ground scrap passes out of the machine in a hot condition, and must be cooled, either by spreading on a concrete floor or by means of a pneumatic cooling plant.

The mixing-machine house is usually a storied building, and the material passes from one floor to the other through the various machines, which are steam-heated, and consist of a series of rollers smooth and spiked. When the material emerges from the machines it is thoroughly mixed together. The mixed material is then carried by elevators to the spreading machine, where it is spread on the canvas by means of steam-heated rollers, and passed through a calendering machine. The linoleum is now ready for the drying-room, if no pattern is to be printed thereon, but, when a pattern is to be printed, it is put into rolls and is ready for the printer.

Cork Carpet.—This is made of the same materials as linoleum, the only difference being in the treatment of the materials. The oil, instead of being oxidised, is boiled until it becomes congealed, and the cork is not ground so fine. The mixing, rolling, calendering, and drying processes are similar to ordinary linoleum. After being dried, cork carpet is rubbed by sand-papering machines to smooth the surface of the cloth, and the dust is removed by an exhaust apparatus to a dust-house outside the building.

Inlaid Linoleum.—This is a class of material which has become

very popular in recent years. The defect of ordinary linoleum has always been the difficulty of keeping the pattern fresh, as the painted surface washes off, leaving the floor covering unsightly. To obviate this, the new linoleum is made of coloured material, the colouring going right through to the back. The colours are mixed in exactly the same manner as those for ordinary linoleum, the mixing machines being similar, but instead of cork, ground sawdust is used. The sawdust is not as a rule ground on the premises. After the material is mixed, it is passed through a cyclone cooling machine (an apparatus similar in appearance to the cyclone collectors seen in wood-working risks), and is then laid on concrete floors to cool thoroughly before being put into bags.

To make the linoleum a series of perforated metal trays are used, there being one tray for each colour. There are sometimes as many as nine trays in a set, and they fit into each other with the greatest accuracy. The first of a set of trays is placed on the top of the canvas, and a quantity of the necessary colour is taken and rubbed through the perforated pattern on the tray. The tray is then removed, leaving the colour on the canvas, and the process is repeated until the design has been built up. The cloth is then moved forward to a hydraulic press, which forms part of the machine, and it remains there under pressure, between metal plates, while the colours are being placed on the next portion of the canvas. This process is also done by machinery, the machine being of complicated design, inlaying as many as nine colours simultaneously, and capable of turning out a large quantity of finished material. The back of the cloth then receives a coat of red paint, and the linoleum is placed in the drying-room to mature.

Another process of inlaying is the Walton patent process, in which the colours are rolled in thin sheets, and, by a wonderful arrangement of cutters, the pattern is cut out in each colour and deposited on the canvas, the pieces fitting in with the utmost accuracy, and passed through a calendering machine. The machine is a complicated piece of mechanism, and could not be described without the aid of diagrams.

We have now traced the manufacture of floorcloth and linoleum to the printing stage. Printing is divided into two classes —hand printing and machine printing.

Hand Printing.—The hand printing house is usually a building of two storeys, the lower storey being very lofty, varying from

forty-five to fifty feet in height, and the top flat is of ordinary height. The hand printing tables are placed on the top flat, and immediately in front of each table is another revolving table for the printing blocks and colours. A hand printing block is eighteen inches square, and consists of four layers of wood each about half-inch thick, fixed together, with the pattern either cut out on the wood or set in metal type, brass, copper, and lead being used. The wood patterns are usually cut out and the type cast and fixed on the premises, but the thick wooden blocks are imported from America. The floorcloth or linoleum is laid on the printing table, and the printer takes the first block of a set and daubs it with colour. With the aid of a spring hand-press, which is suspended from a beam, the colour is printed, the process being repeated until the first colour has been printed on the whole width of the linoleum. The other blocks are then taken in rotation, and the result is the finished pattern. The cloth is then moved forward, and, as printing progresses, is suspended in the lower storey, known as the suspending room, there being openings in the floor for the purpose, until the whole piece is printed, when it is moved to the drying or seasoning room. The process is slow, and a simple sum in arithmetic will show that 7200 impressions require to be made for a nine-colour pattern on a full-size canvas—eight yards by twenty-five yards.

Machine Printing.—There are various forms of machines, and altogether I have come across five distinct types, but in modern practice only two of these are common.

(1) The roller printing machine, which in form is somewhat similar to a calico printing machine. The rollers are of wood, and the patterns are composed of a gelatinous material fixed to the roller. The rollers are not usually made on the premises. The printing process is a continuous one, and the machine has the capacity of turning out a large quantity of printed material.

(2) The American machine, in which printing blocks similar to those used in hand printing are used, is made to print as many as nine colours simultaneously. The machines I have seen are of two sizes, two yards and three yards wide. The blocks stretch across the width of the machine, and are placed at intervals of about eighteen inches, the blocks themselves being eighteen inches wide. For each block there is a paint trough with roller, and when the machine is set in motion the blocks are raised up, the paint troughs are drawn under the blocks, and the paint applied

to the blocks by rollers. The blocks, which all work simultaneously, then fall on the cloth, and the pattern is printed thereon. The most modern examples of these machines are worked by electro motors, and are set on rails so that they can be moved from one part of the printing room to another. This is rendered necessary as one machine is used for feeding a number of drying-rooms. The cloth passes direct from the printing machines to the drying-rooms, not being suspended in hanging-rooms as in the case of hand-printed material. The linoleum is, as a rule, first trimmed and measured before being passed into the drying-room.

Drying Rooms.—In hand-printed drying-rooms each piece of cloth is suspended from a wood or iron batten, and the cloth is transferred from the suspending rooms, already mentioned, to the drying-rooms through vertical openings in the walls, about one foot wide, extending from floor to roof of the buildings, and protected by double iron doors. In machine-printed floorcloth drying-rooms, the cloth passes direct from the printing machine through a horizontal opening, about one foot wide, protected by double iron shutters, and is suspended in festoons from metal rods.

Floorcloth is usually printed on the top floor of a four or five storey building adjoining the drying-rooms, the lower floors being used as a warehouse. The drying-rooms, as a rule, are of one lofty storey, and communicate with the warehouse on the ground floor by double fireproof doors. The quantity of floorcloth in a single drying-room is seldom less than 1900 yards, but sometimes 3800 and as much as 7600 yards can be put into one drying-room.

In the newest type of linoleum drying-rooms, the cloth is laid in a horizontal position and is supported on wires stretched from end to end of the building, there being a space of about two inches between each piece of linoleum. These drying-rooms are usually about one hundred and eighty feet long by ten feet wide, when two-yard material is dried, the quantity of material in a single drying-room at one time being about 7000 yards. In the modern linoleum works the machine printing house is of one storey, and the cloth passes from the machine to the drying-room through a passing-house of four or five storeys in height. There are openings in the floors of this building for passing the cloth, and the drying-rooms communicate with each floor of the passing-house by single fireproof doors. The one end of these drying-rooms is practically a wall composed of single fireproof doors.

Hazards.—All the materials used in the manufacture of floorcloth and linoleum are very combustible. In floorcloth factories we have oil boiling by fire heat, mixing of oil with naphtha, varnish making, paint mixing, and storage of large quantities of oils. The hazards of these materials are obvious. The buildings in which they are manipulated, or stored, should be detached or of fireproof construction, and so arranged that a fire can be confined to the building in which it originates. We have also the hazards from drying-rooms. All these rooms should be cut off from the adjoining buildings by double fireproof doors. The buildings themselves should be of one storey, or the floors should be of fireproof construction. In one-storey buildings the only woodwork should be the roof, and this should be plastered inside, the lathing being of metal, but a fireproof roof is preferable.

Attention should be paid to ventilation and lighting. Open gas lights in drying-rooms are objectionable. In hand-trowelled drying chambers there is a large amount of woodwork to add fuel to a fire. I have noticed in some factories drying-rooms of two storeys, the lofty ground floor being the drying-room proper and the upper floor a store for whiting or other material, the upper floor being of wood. Drying-rooms should be built so that except under very exceptional circumstances a fire could be localised.

Varnishing of printed floorcloth has its own special hazard, and a year or two ago caused a fire which resulted in total loss. No gas lights should be allowed near the machines. There is, I understand, a certain electrical hazard at the machine.

Block Washing.—As it is necessary to wash the paint off the blocks with naphtha, or other spirit, a separate building should be provided for the purpose, and no open lights allowed. Usually the block-washing house is of corrugated iron, and suspended on the outer wall of the printing-room. Where machine printing is done, the blocks, owing to great weight, must be washed at the machine. Electric light only should be allowed; a suitable trough of large capacity provided; the supply of spirit should be as small as possible, and when not in use should be kept in a metal can with proper-fitting lid.

The above hazards are common to both floorcloth and linoleum, butlinoleum has special hazards of its o wn.

(1) *Cork Grinding and Storage.*—The cork bales should be packed as tightly as possible, and the buildings should be used for

no other purpose. I noticed in one case a circular saw bench for wood-working in a cork store, the material being loosely packed, and the building itself of wood. The cork should be properly cleaned, and magnets are in my opinion an imperative necessity, as fires are often caused by metal in the cork. There is usually a great deal of dust in suspension in a cork-grinding mill, and some experts say that cork dust is as explosive as gunpowder, but, so far as I have been able to ascertain, explosions are of rare occurrence. A possible explanation of this is that the cork is never thoroughly dry, and the dust is usually mixed with a great quantity of steam, so that we seldom have the exact combination of dry cork dust and air which will make an explosive mixture. In some works the dust is drawn off by means of pneumatic tubes, and the result is apparently satisfactory. There is, however, the danger of explosion, and as a precaution it is as well to have no artificial light, other than electric light, or enclosed gas lights. Great care should be taken with the journals in cork mills to prevent over-heating, friction being a common cause of fires. The roofs of cork mills and adjacent buildings should have attention, and, especially in summer, be washed periodically to prevent sparks setting fire to the cork dust with which the roofs soon become coated.

Oil Boiling.—The boilers should be fired from outside only.

Oil Oxidising.—The contents are, of course, inflammable, and there is the risk of spontaneous combustion if a skin should fall to the floor and not be removed, but I have never heard of a fire from this cause. In oil oxidising sheds there is always a large amount of vapour given off by the oil, but I do not know that it is inflammable. These sheds are seldom lighted inside artificially, an electric lamp outside being usually sufficient.

Scrap Grinding.—The machines should always be cleaned out before leaving, otherwise a fire will ensue.

Colour Storage.—In inlaid factories care should be taken in storage of mixed materials. A proper cooling plant should be installed, and cooled material stored only in fireproof buildings. Certain colours (umbers and greens) are more liable to spontaneous combustion than others, but makers are very careful in regard to storage, the colours being destroyed by heating long before bursting into flame.

Cement Making calls for no special comment, being usually carried on in detached fireproof buildings.

In regard to general arrangements of buildings, it is advisable

to have all preliminary processes in cork and oil carried on in detached or fireproof buildings.

Mixing, Rolling, and Calendering.—All the machines are steam-heated, and cleanliness is imperative.

Hand Printing.—Tow wipes should be removed daily.

Steam Pipes.—All steam pipes should be carefully traced, and where they pass through floors special attention should be paid, and no waste of any kind should be allowed near them. In this connection it may be mentioned that the introduction of electro-motors has been the means of displacing a large number of small steam engines, consequently reducing the risk from steam pipes.

Warehouses.—The storage of the finished material presents few special features. We, of course, find large quantities of goods stored in manufacturing portions of the works, especially in floor-cloth works and hand-printed linoleum works, but, in buildings used for warehouse purposes only, there is little risk apart from straw packing on ground floor. Fires in warehouses can, however, cause heavy losses, water damage being the bugbear. The rolls of cloth are almost invariably placed upright on the warehouse floors, and consequently a few inches of water on the floor does serious damage, especially if the water reaches the lower floors. This danger from water damage must, I think, be accepted as one of the risks of the class, which can only be guarded against to a certain extent. In some cases a trellis floor about two inches above the ordinary floor is provided, but in large warehouses this is out of the question, as, owing to the weight of the rolls, they are moved by means of trolleys, and these can only run on a smooth floor. When a floor is trellissed, passages for trolleys take up much valuable space.

Loss Experience.—During the past ten years I do not suppose the business all over has been profitable to the Offices, judging from the number who have ceased to write the class. I am strongly of opinion, however, that the business can be made, and is, profitable, provided due care is exercised in accepting risks. Having had occasion to inspect practically the whole of the factories in Scotland, I should not advise writing the class too freely.

Defects.—There are some factories bristling with defects. The buildings are old, badly arranged, not too substantial, adapted, as they often are, crowded, badly ventilated, and in some cases badly kept. The iron doors in many cases are useless, and so-

called fireproof doors, being ordinary wood doors with tin nailed to them, and hung in wood frames, are quite common in some drying-rooms. A one-storey power-loom weaving shed cannot be regarded as a first-class drying-room for linoleum, and yet this class is accepted at the same rate as well-arranged drying rooms at other works.

Appliances —The value of sprinklers has been recognised by the leading makers, and the smaller firms are gradually falling into line. Doubts have been expressed as to whether sprinklers are of much account in these risks, on account of the height of the buildings—drying-rooms and suspending rooms especially—but it would appear that where the sprinklers were kept efficient they have with one exception confined the fire to the building in which it commenced. More cannot be expected, especially in drying-rooms, where the stock loss is usually almost total. In addition to sprinklers a good supply of ordinary appliances should be provided.

PORTLAND CEMENT WORKS.

By FRED. W. PANTON.

A Paper read before the Insurance Institute of Newcastle-on-Tyne, 26th January, 1906.

In preparing a paper for submission to you this evening, I have modified the scope of the original title to Portland Cement Works. My reasons for so doing are that Portland cement is by far the most important artificial lime now in use; that in the preparation of other cements used for building purposes analogous processes are followed and similar machinery used, wholly or in part; and, thirdly, that where other cements—such as Roman, or Natural, cements—are made, the plant for their production usually forms part of, and is subsidiary to, a larger Portland cement works.

In arranging this paper I have endeavoured first to give some historical notes on the industry, then to outline the various processes of manufacture and plant employed, and finally to indicate what are the principal features of fire hazard presented by this class of risk.

The name "Portland cement" was given by John Aspdin of Leeds, bricklayer, to an artificial cement patented by him in 1824. His choice of the term arose from a fancied resemblance in the colour and texture of the cement to that of the famous Portland building stone. The specification of his original patent is interesting in view of modern cement-making methods, and runs as follows:—

"My method of making a cement or artificial stone for stuccoing buildings, water-works, cisterns, or any other purpose to which it may be applicable (and which I call Portland cement) is as follows:—I take a specific quantity of limestone, such as that generally used for making or repairing roads, and I take it from the roads after it is reduced to a puddle or powder; but if I

cannot obtain a sufficient quantity of the above from the roads I obtain the limestone itself, and I cause the puddle or powder, or the limestone, as the case may be, to be calcined. I then take a specific quantity of argillaceous earth or clay, and mix them with water to a state approaching impalpability, either by manual labour or machinery. After this proceeding I put the above mixture into a slip pan for evaporation, either by the heat of the sun, or by submitting it to the action of fire or steam conveyed in flues or pipes under or near the pan, till the water is entirely evaporated. Then I break the said mixture into suitable lumps, and calcine them in a furnace similar to a lime-kiln, till the carbonic acid is entirely expelled. The mixture so calcined is to be ground, beat, or rolled to a fine powder, and is then in a fit state for making cement or artificial stone. This powder is to be mixed with a sufficient quantity of water to bring it into the consistency of mortar, and thus applied to the purposes wanted."

The process of cement manufacture has advanced considerably since Aspdin's day. The original source of supply for lime constituents is not, I believe, utilised; for while it might be possible for a Yorkshire bricklayer (probably under the cover of darkness) to collect from the King's highways a sufficient quantity of powdered limestone for his experiments, such a proceeding by a manufacturer on a large scale indubitably would excite the ire of the Local Authorities maintaining the said highways. It was soon discovered that chalk provided excellent lime constituents, and its amenity to treatment with water obviated the preliminary kilning in Aspdin's process. In the early stages of manufacture all material from the cement kiln approaching a clinkered state was rejected. This was following in the steps of makers of Roman, or Natural, cements, who found their cement spoiled if calcining was carried beyond a comparatively low temperature. Later experiments proved that Portland cement gave the best results when burning was pushed to the point of incipient vitrefaction. In heat and labour-saving appliances great strides have been made, until at the present day, in a rotary kiln plant, the materials can be handled automatically from the earliest stage of manufacture to delivery of the finished cement in the warehouse.

Reverting to the history of the industry, we find that a factory was started in 1825 at Wakefield, and a certain amount of progress must have been rapidly made, as the cement was used in

the construction of the Thames Tunnel in 1828. For some time, however, the Portland cement industry had a very precarious struggle for existence, until a series of experiments in connection with the London drainage works in 1859 proved to engineers the valuable qualities of the new cement.

Portland cement chiefly consists of a somewhat intricate series of silicates of lime and alumina, produced by heating to the point of incipient vitrefaction an intimate mixture of argillaceous and calcareous materials. A typical analysis of a good cement may be given as follows:—

Lime (CaO)	62·0	per cent.
Silica (SiO_2)	22·0	"
Alumina (Al_2O_3)	7·5	"
Ferric Oxide (Fe_2O_3)	3·5	"
Sulphuric Anhydride (SO_3) ..	1·5	"
Magnesia (MgO)	1·0	"
Carbonic Anhydride (CO_2) ..	·5	"
Water (H_2O)	·5	"
Alkalies	·5	"
Insoluble residue	1·0	"
	100·0	"

Any raw materials containing the proper proportions of lime and silica may be employed, provided they can be efficiently manipulated and an intimate mixture obtained. Chalk and clay are the substances generally used in this country, and the best argillaceous elements are furnished by the alluvial deposits of the Thames and Medway Valleys. That district, possessing also an abundant supply of high-grade chalk, is an important centre of manufacture for high-class cements, and at one time practically controlled the trade of the world. Cement factories, however, are now found in various parts of this country, and extensive works are also established in Belgium, Germany, and the United States.

The process of manufacture is divided into three distinct operations, viz.:—

1. Obtaining an intimate mixture of the raw materials.
2. Calcining the mixture to the point of incipient vitrefaction in order to produce the necessary chemical combinations.

3. Reducing the calcined product to powder, in which state it unites with water and forms the hard, tenacious cement so familiar nowadays.

Mixture of Raw Materials.

In order that the chemical changes caused by heating in the kiln should be complete throughout the whole mass of materials, an exceedingly intimate mixture is necessary. There are three methods of obtaining this result—the wet method, the semi-wet or Goreham method, and the dry method. The first was at one time generally employed in this country, but is now largely superseded by the second. The third is employed extensively on the Continent and in districts where the raw materials are too hard for the successful adoption of wet treatment.

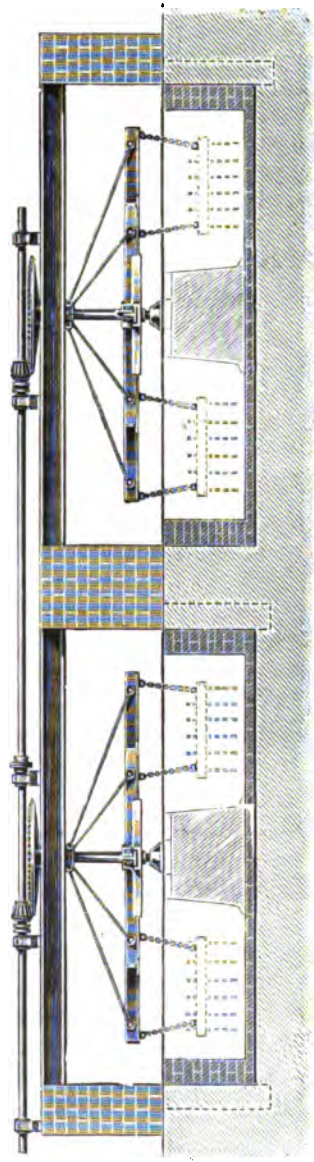
The Wet Method—the Wash Mill.

This process consists of mixing the requisite quantities of clay and chalk with a large excess of water in a wash mill. The mill is a circular pit, about 20 feet in diameter, lined with brickwork. A vertical spindle rises in the centre, and from it horizontal arms radiate. Heavy harrows are suspended by chains from these arms, which break up and thoroughly mix the materials. The mill revolves about 20 times per minute. Water is constantly fed into the mill from a central pipe, and when the raw materials are sufficiently reduced they rise with the water and overflow the circumference of the mill. The outlet is provided with a fine sieve which rejects any particles insufficiently reduced. The thin liquid produced is called "slurry," and is taken by pump or gravitation to large settling-tanks or "backs." The solids in suspension are gradually deposited here, and the clear water decanted from time to time until the remaining slurry is of a sufficiently dense nature for removal to the drying-floor.

The Semi-Wet Method

was patented by Goreham in 1872. In this process, instead of the washmill doing the whole work of reducing and mixing the raw materials, merely a preliminary mixing is done in it. A much smaller quantity of water is added to the materials under treatment, and the resultant slurry is a heavy viscous liquid containing 38 to 50 per cent. of water only. In place of the fine sieves used in the wet process, stout iron gratings are fitted to the washmill outlet. The bars of the gratings are about three-eights of an inch apart,

SLURRY PUMP.



PAIR OF WASH MILLS.

(Messrs. Edgar Allen & Co., Ltd., Sheffield.)

and their main object is to prevent any flint pebbles, occurring in the chalk, from passing over with the slurry. In order to complete the intimate mixture the slurry now passes out to the wet mill, a sifting-machine intervening in some cases.

The Wet Mill.

In this country burr stones, usually horizontal, but occasionally vertical, are used; but I understand that on the Continent the tube mill (of which a description will be given later) is coming in vogue. The slurry, which is just liquid enough to flow, is finely ground, the particles of chalk and clay being thus brought into close conjunction. Horizontal stones make about 150 revolutions per minute, vertical stones 160 to 200. From the mill foot the slurry is pumped either direct to storage tanks or is further treated in an agitator with the object of securing a thoroughly homogeneous mixture. A later development is to abolish the intermediate vat, and fit the storage tank with an agitator continuously moving at a slow speed, thus ensuring a uniform density for the whole of the contents of the tank.

The advantages claimed for the semi-wet method in comparison with the older wet process are, first, that the resultant slurry is more even in character; secondly, that it can be more easily tested and any disproportion in the ingredients rectified; thirdly, that the long time necessary for precipitation in the settling backs is not required; fourthly, that in place of extensive backs occupying a large ground area, only one or two comparatively small storage tanks are requisite; and, lastly, that by using the minimum quantity of water in preparing a workable mixture, much time is saved on the drying-floors.

The Dry Method.

This method is generally employed where chalk is not available and hard carbonates of lime are used in its stead. Speaking broadly, it may be said to be only adopted where the raw materials are not amenable to wash-mill treatment. The raw materials are at first treated separately. Where clays or other wet silicates are used in conjunction with hard limestones, the former must be thoroughly dried. This is done on a drying flat heated either by fire flues or steam pipes. The dry materials are pulverised separately by machinery similar to that employed in the reduction of cement clinker, and which will be described later. After sifting the ground materials are mixed in a long tank through which a horizontal shaft runs. The shaft is fitted with beaters set at an

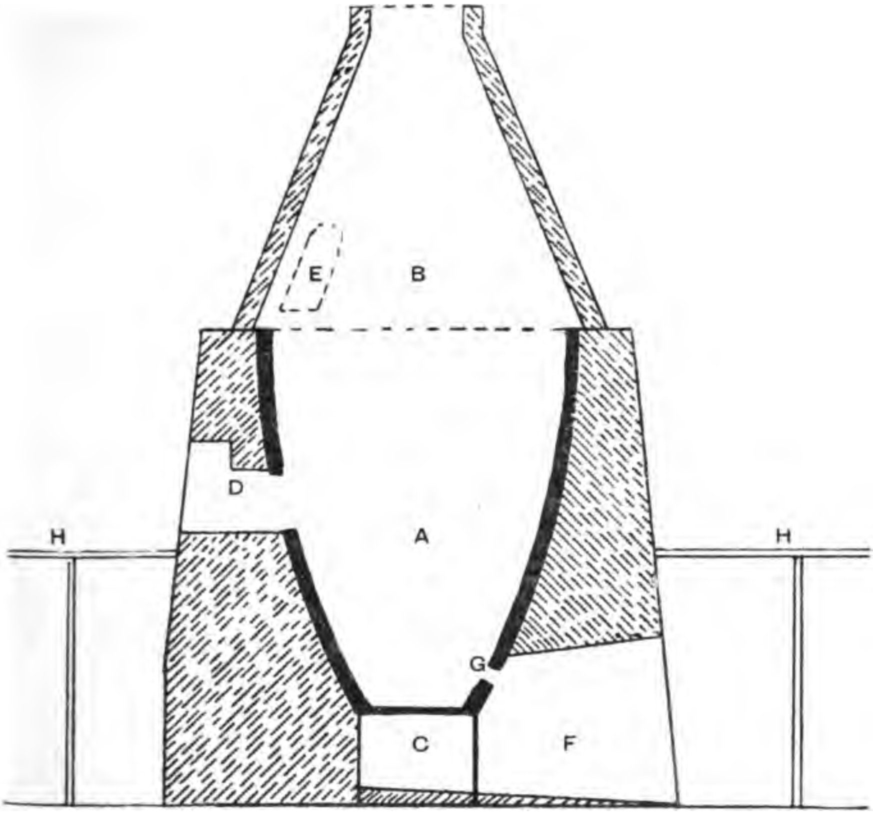
angle like propeller blades. Sufficient water is added to form a stiff paste. As the shaft revolves the beaters mix and knead the materials, passing them forward to a brick-making machine attached to the delivery end of the mixer.

The Drying Flat or Hot Plate.

The first stage of manufacture being now completed by one of the three methods above described, the material must be prepared for the second stage, *i.e.*, kiln burning. The slurry, or composition, by whichever method we obtain it, contains a greater or less quantity of water which must be expelled before it is ready for burning. In many cases the slurry is dried by waste heat from the kilns, but where certain types of the latter are in use a separate drying chamber is necessary, termed the drying flat, or hot plate. This consists of a large floor built over a range of fire-heated or coke oven flues. That portion of the floor immediately over the ovens, and for the first 20 feet or so therefrom, is constructed of fire bricks or fire tiles; the remainder may be formed of stout iron plates. The whole is covered with a shed roof as weather protection, and there will probably be some weather boarding at the sides. The slurry is pumped on to the floor from 6 to 12 inches deep. The composition bricks obtained by the dry method are similarly dried. When dry the slurry is broken up and is ready for burning. The coke from the ovens may be used in burning the kiln charge.

Kiln Burning.

Three processes take place in this, the second great stage of manufacture. First, any moisture remaining in the slurry when it leaves the drying flat is dissipated; secondly, practically all carbonic acid present in the raw materials is driven off, merely 0·5 per cent. remaining in the finished product; and thirdly, on reaching the state of incipient vitrefaction various chemical combinations occur between the different elemental substances contained in the heated mass. The maximum temperature attained in the kiln is from 2800 to 3000 degrees Fahrenheit. Kilns may be divided into two great classes, viz., intermittent and continuous. All the kilns used in the early days of cement manufacture were of the former type. When we consider than an intermittent kiln dealing with, say, 35 tons of slurry takes practically a week for a "run"—*i.e.*, charging, burning, cooling, and drawing—and also that in each run the kiln has to be heated to nearly 50 times its original temperature and cooled again, the wastefulness of such



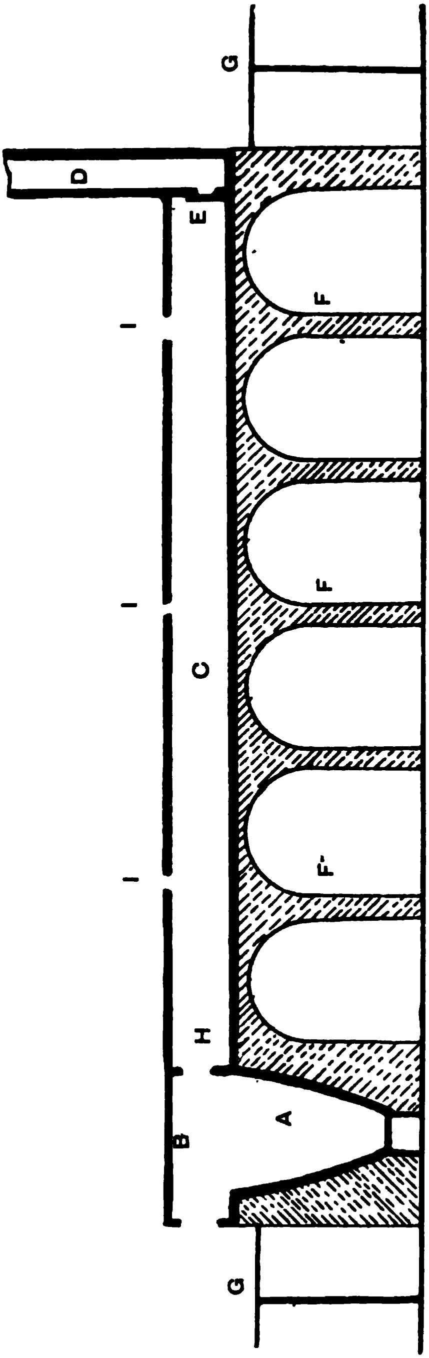
SKETCH OF BOTTLE KILN.

plant, both in fuel and time, is apparent. Therefore it is not surprising that the attention of manufacturers was soon directed towards effecting economies in kiln working. The first step gained was the successful utilisation of the waste heat from the kilns for drying prepared slurry. Later experiments produced various kilns designed for continuous burning, but for some time the quality of clinker obtained from them was not satisfactory. However, many improvements have been introduced of late years, and the modern rotary kiln fulfils the requirements of supplying a large volume of excellent clinker at a minimum expenditure of time and fuel. At the present time widely divergent views are held by manufacturers on the efficacy of

particular kilns. The following are some of the principal designs:—

The Bottle Kiln. This kiln was used in Aspdin's original factory, and for a long time was the only type to be found in cement works. It is certainly the most expensive kiln to work, as, in addition to the inevitable wastefulness of all intermittent kilns, no use whatever is made of the waste heat. However, it is maintained by some authorities that the clinker produced is of a more even and reliable quality than that obtained by any other method. Therefore, whilst in many factories more economical types have been introduced, we still find several survivals of the earliest kiln.

It consists of a large burning chamber, marked A on sketch, lined with fire brick and supported by strong masonry. This is surmounted by a bottle-shaped cone, B, constructed of brickwork. The walls of the burning chamber converge towards an open bottom, in which a grate of fire bars, C, is placed. Sufficient faggots to start a fire having been laid on the bars, the burning chamber is filled with alternate layers of coke and dried slurry. This is done through an opening in the side known as the charging eye, D. Many kilns have a second charging eye, E, in the cone, so that the burning chambers may be filled to the top. On completion of the charge these eyes are walled up and the fire started. Under favourable conditions the kiln is burnt out in from two to three days, during which time the charge has shrunk to about two-thirds of its original bulk, owing to evaporation of carbonic acid and residuary moisture. Two days or so must be allowed for cooling; then the fire-bars are withdrawn through a low arch at the base of the kiln, known as the drawing eye, F, and the calcined product termed "clinker" falls down. The small opening, G, is called the "poker eye." Through it the kiln-drawer can pass a long iron rod to detach any pieces of clinker adhering to the sides of the kiln. The materials are fed into the charging eye from a stage or platform, H, generally constructed of wood, occasionally of concrete and steel. Where this staging does not extend over the drawing eye the latter will often have a shed roof over it for weather protection to clinker and workmen. At the drawing eye the clinker is broken by hand into pieces of a suitable size, and removed in barrows or trucks to the reduction plant.



Sketch of Chamber Kiln.

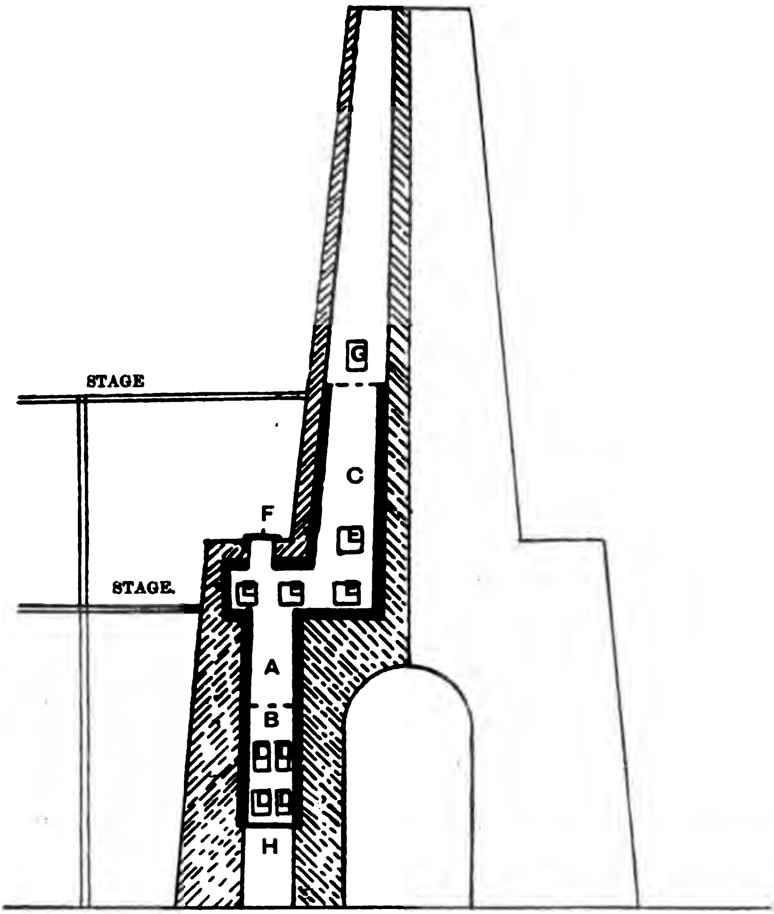
The Chamber, or Tunnel Kiln.

The first problem in economy solved by kiln designers was the utilisation of waste heat from the burning chamber. In 1872, Mr. I. C. Johnson, of Gateshead and Greenhithe Works, patented a kiln which crowned with success a long series of experiments. At the present day chamber kilns of this design are probably the most popular with English manufacturers. The accompanying sketch explains the principle of the kiln. The burning chamber, A, is similar to that of the bottle kiln. In place of the open cone we have a brick dome, B, from which a long flue or tunnel, C, runs to a chimney shaft, D, the opening being fitted with a damper, E. Unless a convenient bank of solid earth is available the tunnel must be supported on strong arches of masonry, F. The kiln is charged from a platform or stage, G, and when full a dwarf brick partition, H, is built between the kiln top and the flue. Through inlets in the roof, I, wet slurry is pumped on the floor of the flue, which slopes slightly towards the kiln, so that at this end it will probably be 12 inches deep but only 6 inches at the cool or shaft end. The roof openings are closed with metal plates, and the charging opening by masonry or by a sliding door of firebricks in a wrought-iron frame. When the fire is started the gaseous products of combustion pass over the slurry to the shaft, drying the former in readiness for the next charge. Burning is complete in about 48 hours, and both ends of the tunnel are then opened. In some cases a fan is connected for the more rapid dispersal of foul gases. It is usual to erect chamber kilns in nests of half a dozen or so, all connected to one shaft. They are then worked in rotation, with the result that a good draught is obtained as soon as the fire is started, owing to the chimney never being allowed to cool. A chamber kiln taking a charge of 30 to 35 tons completes a run in six or seven days.

Several modifications of the original design are found. At some works the slurry is dried from below and not by top heat. Where such is the case the flues or tunnels are not more than 12 to 18 inches deep, and instead of being roofed with masonry are covered with stout iron plates. The slurry is pumped on to the drying-floor thus formed, and is protected from weather by a light shed roof. In Batchelor's Patent Kiln both top and bottom drying is afforded. It consists of an upper and lower chamber carried on two tiers of arches superimposed. The gaseous products

of combustion pass from the kiln through the top chamber, and by an ingenious system of flues, descend at the far end into the lower chamber, which they traverse twice before passing off into the chimney. This kiln has an advantage over the ordinary type in factories with a limited ground area, as the length of the chambers or flues is reduced by practically one half. Another mode of drying by both top and bottom heat is to roof a tunnel of Johnson's type with stout iron plates instead of masonry, and to use the top of the plates as a drying-floor

The Hoffmann Kiln may be described as being partly continuous in action. It is largely used for brick-making, but not extensively employed in cement manufacture in England. There are two great reasons for this, the first being that the slurry must be pressed into brick form before being burnt, and the second being that while economical in fuel it is expensive in labour. On the Continent, however, where the dry method of working is largely in vogue, and where the ratio between the prices of fuel and labour is somewhat the reverse of that in England, it is extensively employed. The kiln consists of a series of chambers built round a central shaft. Each chamber is connected with the shaft by flue and dampers, and there are openings between the chambers also fitted with dampers. The chambers are worked in rotation. Supposing No. 1 chamber to be burning, No. 2 is loaded with slurry bricks; when this is complete the damper between No. 1 and the shaft flue is closed, and that between Nos. 1 and 2 opened. The products of combustion are thus taken to the shaft through the second chamber, the waste heat from a burning charge being utilised for the preliminary heating of the succeeding chamber. No. 3 chamber is then loaded and communication between it and No. 2 opened, the damper between No. 2 and the shaft flue being closed. Successive chambers are similarly worked round the whole kiln. The cold air entering the kiln is made to pass through the compartments in which calcination is complete, cooling the finished clinker and itself becoming heated before entering the burning chamber. Coal is used for fuel instead of coke, and is fed into the burning chambers at frequent intervals through openings in the domes fitted with iron covers. The whole kiln is usually covered with a shed roof, and the heat from the top of the chambers may be used for drying purposes.

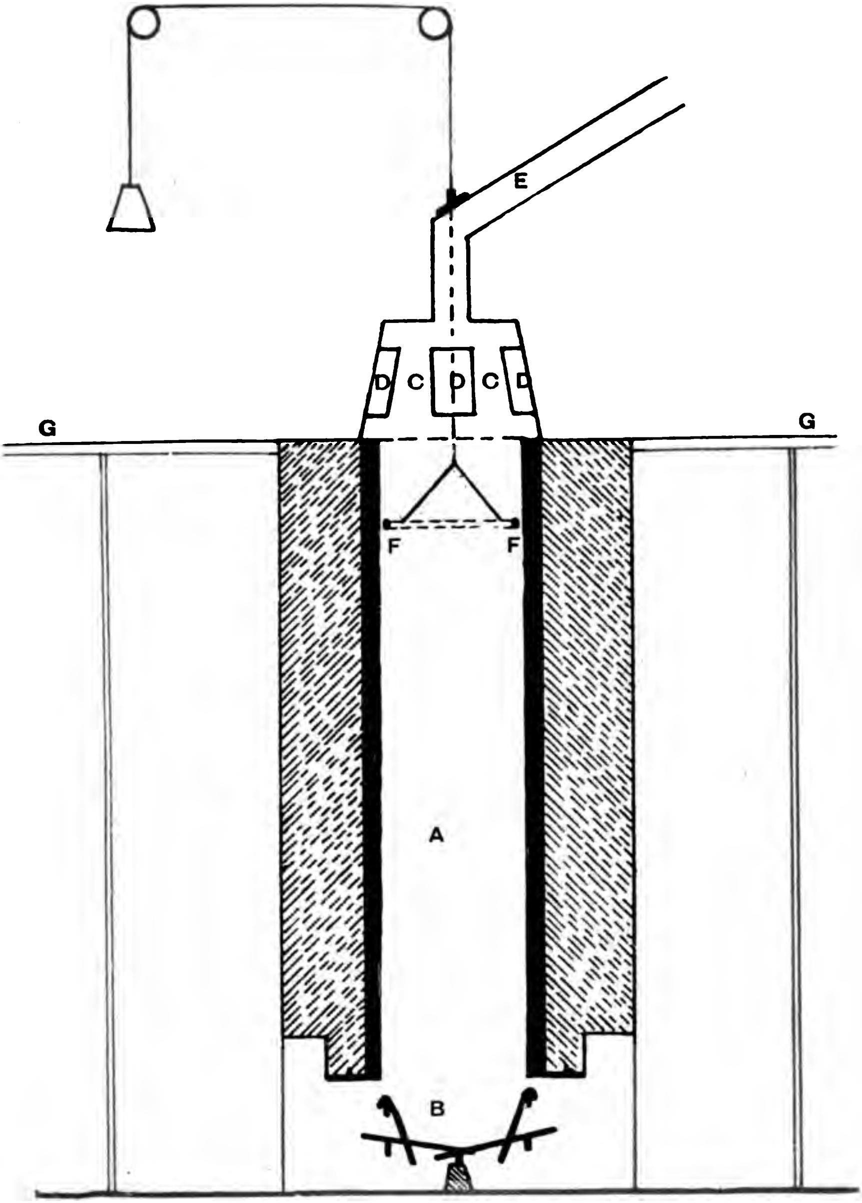


PAIR OF DIETSCH KILNS.

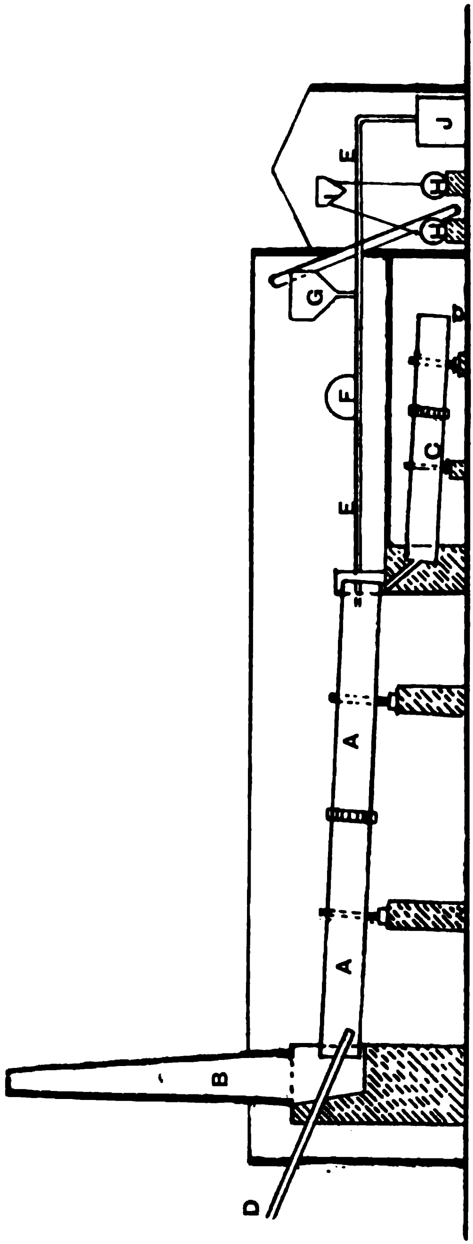
The Dietsch Kiln. This kiln is continuous in working, inasmuch as the finished clinker can be withdrawn and fresh charges introduced without cooling the kiln. However, a separate drying-floor for slurry is necessary, as, although the mass of slurry waiting to be burned in the next charge is raised to a considerable temperature by the waste heat of the kiln, it is not possible to deal with wet materials. The accompanying sketch shows two kilns back to back, and it will be seen that the kiln consists of two vertical shafts, one above the other, not in the same plane, but connected by a horizontal

passage. The upper part of the lower shaft, A, forms the combustion chamber, the lower portion of the same shaft, B is filled with clinker that has been burned and is now cooling, while the upper shaft, C, contains lumps of dried slurry. The method of working the kiln is as follows:—When a charge is sufficiently burned, a quantity of clinker is drawn from B through openings D, thus causing the lately-burned charge to fall from A into B. Fresh slurry is then raked from C into A through openings E, and fuel added through opening F. The stock of dried slurry in C is replenished from time to time through the charging eye, G. All the four sets of openings above mentioned are closed by iron doors when not in actual use. Therefore the whole air supply for the kiln must pass up through the grate, H, with the result that the mass of clinker in B is cooled thereby, and the air itself has attained a considerable temperature by the time it reaches the burning zone. As coal can be used for fuel, this kiln is most frequently to be found in districts where a good supply of coke is difficult to obtain. It is objected to by some authorities on the ground that a large proportion of the clinker is imperfectly burned. Stagings or platforms, as indicated in the sketch, are necessary for working the kiln.

The Schneider Kiln is somewhat analogous to the Dietsch Kiln, though quite different in design. A separate drying-floor for slurry must be provided, and the air to support combustion passes over the clinker already consigned before entering the burning zone. I am indebted to a manufacturer for the following particulars:—"The kiln consists of a brick shaft, A, about 40 feet in height, with fire bars, B, about three feet from the ground. The top of the shaft is covered with a wrought-iron hood, C, with four iron feeding doors, D, at the sides. A flue, E, runs from the top of the hood to a lofty chimney. The kiln is set going by first filling with brick rubbish, &c., to gain the desired level, and starting the fire about 10 feet from the top. The continuous loading is carried out as follows:—A wrought iron ring, F, suspended by chains above the centre of the kiln, is lowered on to the material at the working level, viz., about three feet from the top. The ring is a few inches smaller than the lining, and small lumps of dried slurry are first packed between the ring and the lining to prevent the burning coke from fusing the latter. The coke is then added, and the remainder of the charge of dried slurry. After two or three charges have been put



SKETCH OF SCHNEIDER KILN.



Sketch of Rotary Kiln Plant.

A A—Rotary Kiln.
B—Shaft.
C—Cooler.
D—Slurry Feed Pump.
E—Blast Pipe.
F—Fan.
G—Coal Dust Hopper.
H—Coal Mills.
I—Dust Collector.
J—Coal Dryer.

on, the cooled clinker is drawn from below and the burning zone is kept at approximately a constant level a few feet from the top of the shaft." With this kiln also a lofty working staging, G, is necessary.

The Rotary Kiln. In this kiln we have an important advance on the types of continuous kilns noticed hitherto. In addition to being continuous in action it dispenses with slurry drying flats, and also with the manual labour of charging and drawing. This kiln has a great vogue in America, as much as 90 per cent. of the cement output in the United States being produced by this method, and is now becoming popular with English manufacturers. Nevertheless, the honour of the original experiments in this direction belongs to this country, sundry patents, fruitless in practical result, being taken out between 1877 and 1887. It was left to our American cousins to evolve from our discarded ideas the plant which to-day represents one of the greatest engineering triumphs in cement manufacture.

The kiln consists of an almost, but not quite, horizontal cylinder constructed of boiler plating and lined with fire brick. It varies from 70 feet to about 100 feet in length, and is about six feet in diameter. It rotates slowly (about one revolution per minute), and is supported at either end by strong bearings and by trunnions placed at intervals throughout the length. Fuel, in the form of powdered coal, is blown in at the lower end, and at the upper (or chimney) end wet slurry is fed in. The motion of the kiln causes the slurry to descend gradually into the combustion area, and by the time it reaches here it has been thoroughly dried by the waste heat. At the bottom end white-hot clinker emerges in a granulated form. This falls into a second or cooling cylinder, also rotating, and fitted internally with fixed channel iron guides. These guides thoroughly stir up and cool the clinker, the process being assisted by the air supply for the kiln as in other types of continuous kilns. The clinker on coming out of the cylinder has been cooled to 100° from 120° Fahrenheit, and falls into a conveyor to be taken to the dry mill. Another method of cooling the clinker is to elevate it into a cooling tower some 30 feet in height, down which it gradually falls. Air is blown through the mass from a central perforated pipe.

The Coal Grinding Mill will be attached to the rotary kiln building, and requires special notice. The best coal for the purpose has a low percentage of fixed carbons, and is high in volatile material. It is first dried in

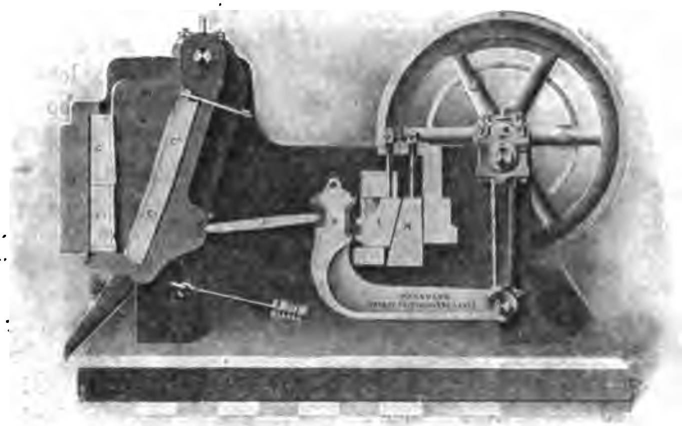
a drum, generally by steam, but sometimes by fire-heated air, and then passes to the grinding machines—either "Griffin" or tube mills, particulars of which will be given later. The powder is very fine, not more than 10 per cent. residue being left on a sieve with 100 meshes per linear inch. From the grinding mill it is taken by elevator to a hopper, from which it is fed into the blast pipe. The blast may be heated by waste heat from the drier.

Of course, certain variations will be found in different works, but the above description may be taken as illustrating the broad principles of working the rotary kiln.

Reduction.—The Dry Mill. The second stage of manufacture being now complete, the material is ready for the final process, viz., reduction to a fine powder. Increasing knowledge of the chemical phenomena exhibited in cement setting has led to a much finer standard being adopted of late years. As an example of this, I may mention that 25 years ago cement leaving a residue of 10 per cent. on a sieve having 40 meshes per linear inch was considered satisfactorily ground, whereas to-day the British standard specification stipulates that not more than 3 per cent. shall remain on a sieve with 76 meshes per linear inch, and for a residue not exceeding 22½ per cent. on a sieve of 180 meshes per linear inch, or 32,400 meshes per square inch. Just now some considerable difference of opinion exists among English manufacturers on the subject of grinding plant. One school maintains that the best quality of cement containing the largest proportion of "floury" powder can only be produced by millstone grinding; the other that equal results can be obtained by the use of Ball and Tube Mills, which have met with such wide acceptance on the Continent. The "Griffin Mill," an American invention, is also in considerable favour with some makers. A few years ago an attempt was made to introduce high-speed machines of the disintegrator type for cement grinding, but the wear and tear from acting on such a refractory substance as cement clinker proved excessive, and they have now been generally discarded. It would be a long task to enumerate all the devices that have from time to time been introduced for cement reduction. I shall, therefore, content myself with a few notes on the plant most customary in the dry mill.

The Crusher. On leaving the kiln the clinker is carefully looked over, and all partially burned or defective pieces rejected. At some factories a picking belt of the

type familiar in our Northern collieries is provided. It is then taken by barrow, truck, or elevator to the crusher. This machine is practically the same as that used for stone-breaking, and the large lumps are broken up between two massive jaws of hardened steel—one fixed, the other moveable and pivoted at its upper extremity. The jaws have corrugated faces, and are set at an angle forming a V-shaped opening, into which the material is fed. The power is generally furnished from a belt pulley on a horizontal driving shaft, which also carries one or two (generally



BLAKE-MARSDEN CRUSHER.—(Mr. H. R. Marsden, Leeds.)

the latter) heavy fly-wheels. Attached to the shaft by a crank or eccentric arrangement is a powerful lever, which in turn is connected with the lower end of the moveable jaw by a secondary lever or toggle plate. At each revolution of the shaft the levers impel the movable jaw towards the fixed one, the return movement being obtained by a spring release. The average speed of a crusher may be stated as 250 revolutions per minute.

Other forms of crushers are occasionally found. One of such consists of a large pair of corrugated or toothed rolls working at a very slow speed. Another, of the coffee mill type, has a conical

reducing roll driven by a vertical spindle, which crushes the clinker against a hardened ring lining the framing of the machine. They are rare, however, the lever type being most frequently adopted. It should be mentioned that the granulated clinker from rotary kilns does not require crushing.

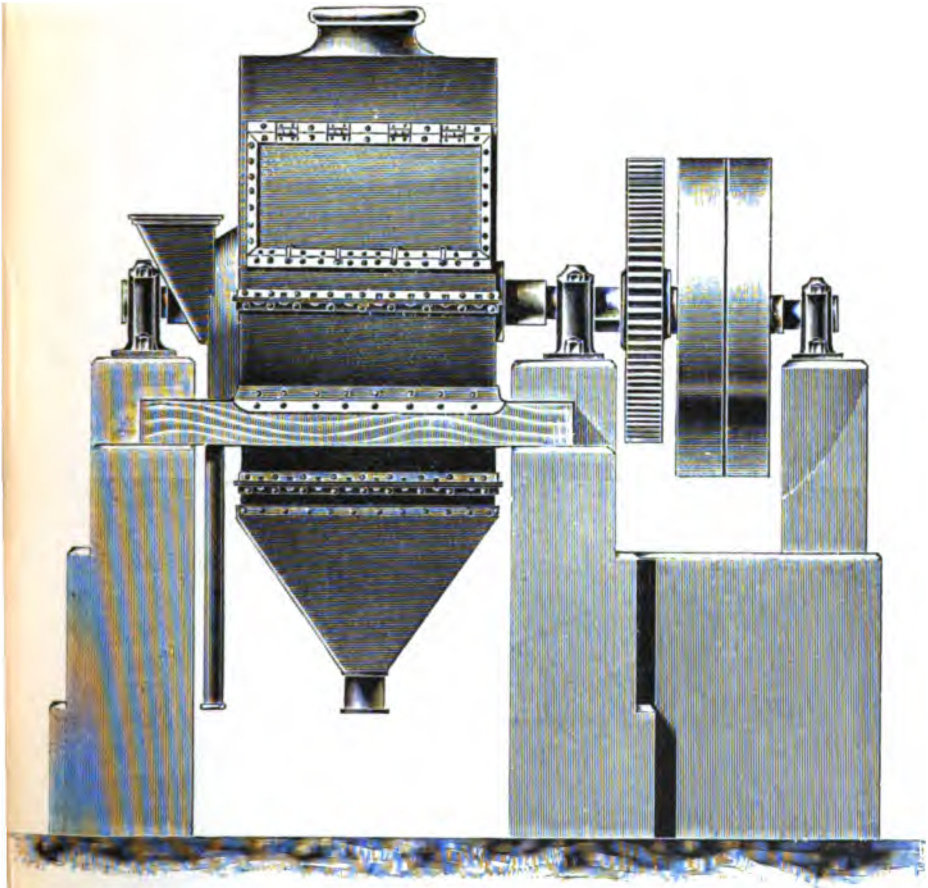
Edge Runners. Where millstone grinding is done, the crushed clinker often receives a first pulverisation from edge-runners before being taken to the stones.

The edge stone mill may be one of two types—either two stones travelling round a fixed pan, as in the ordinary mortar mill, or a pair of stones revolving on a fixed shaft with a rotating grinding table. The stones are very heavy, weighing about three tons each, and are fitted with a thick rim or tyre of hardened iron. The speed of such a mill is about 20 revolutions per minute.

Various edge-stone machines for the further reduction of cement have been patented from time to time, all of a more or less high speed nature, but are now generally discarded, the cost of maintenance having proved excessive.

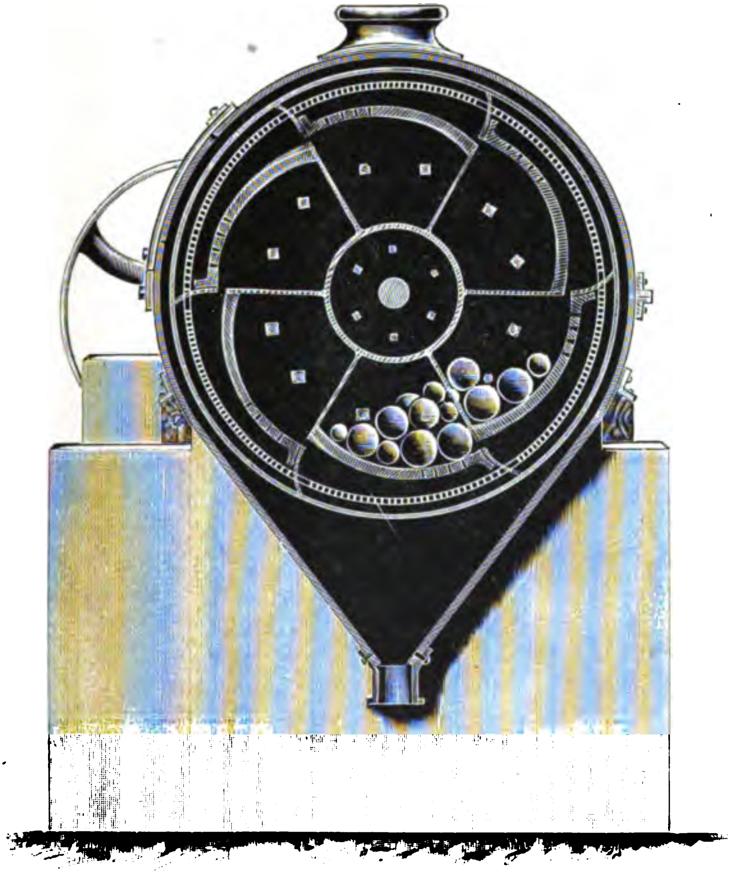
Millstone Grinding. At one time this was the universal mode of reduction adopted in England. The stones are constructed of a specially hard substance known as French "burr," obtained from certain tertiary deposits in France. It differs considerably in appearance from the familiar millstone grit adopted by the corn miller, resembling in the rough state a mass of flinty splinters. The grinding stones are usually 4 feet 6 inches in diameter, and are built up in sections cemented together. Further weight and stability are obtained by a backing of concrete, and the whole is enclosed in stout iron hooping. The stones are finished with a perfectly level grinding surface, in which a number of radial furrows are subsequently cut—this is termed "dressing" the stones. The usual custom is to drive from below by means of bevel gearing on a horizontal shaft. The lower or bedstone is fixed, and the upper stone or "runner" is secured to a vertical spindle rising from the gear through the centre of the lower stone and supported on a metal spindle beam. The whole mill is enclosed in an iron case, with a spout at the bottom delivering into an elevator foot. The feed comes from a hopper through the centre or "eye" of the runner, and is controlled by a worm or other regulating device.

One of the main objections to stone grinding, from a manufacturer's point of view, is the great cost of upkeep. When



VIEW OF BALL MILL.

(Messrs. Edgar Allen & Co., Ltd., Sheffield.)



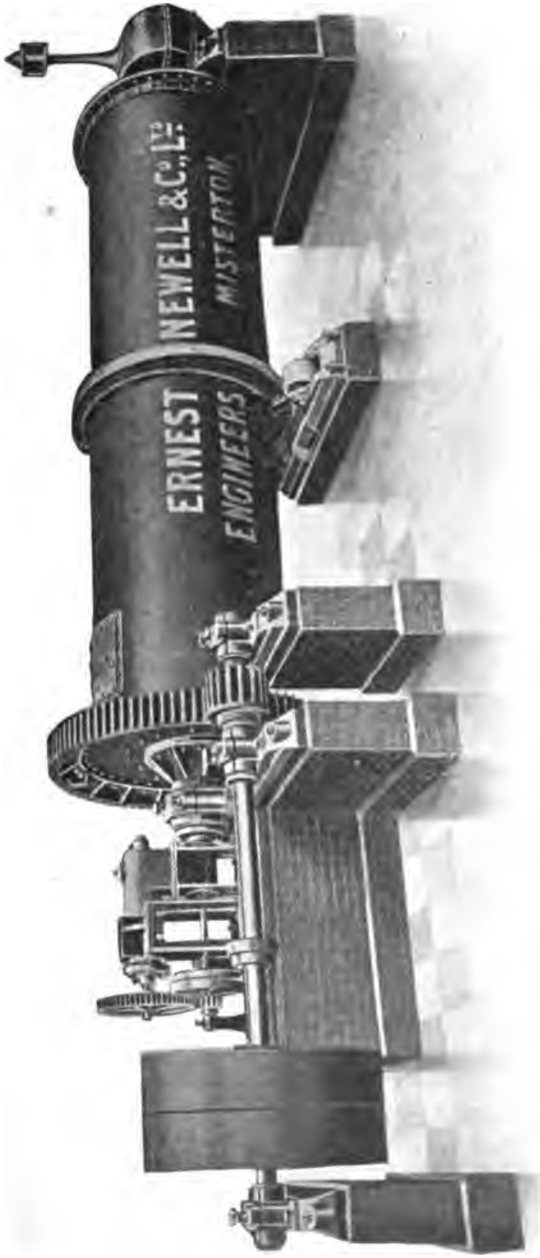
SECTION OF BALL MILL.
(Messrs. Edgar Allen & Co., Ltd., Sheffield.)

a mill has run for something like 36 hours the stones require re-dressing, with the result that in a stone mill one set out of every four is always idle. To overcome this a local firm have invented a millstone having the "face" (or portion nearest the circumference where the finest grinding is done) built up of sections of rock emery embedded in cast metal. It is claimed that the grinding surface does not become smooth with wear, and that an overhaul is necessary only once a month, all that is then required being to slightly plane down the peripheral hooping. Where fine cement is required the ground material may be passed through a second set of stones, or, where stone grinding is not exclusively employed, receive its final reduction in a tube mill. The average speed of millstones is about 150 revolutions per minute.

The Ball Mill. This machine, originally introduced in Germany, is becoming increasingly popular with English manufacturers. It consists of a drum framework varying from about 4 to 10 feet in diameter and from 2 feet 6 inches to 6 feet 6 inches in width. The drum is carried on a revolving horizontal shaft, and the ends are closed by steel plates keyed on to the shaft. The periphery of the drums is built up of steel grinding plates, stepped, as shown in the sectional illustration, and partly perforated. A series of punched steel plates are bolted on to the drum behind the grinding plates, and, surrounding all, fine wire screens are fixed. The whole is enclosed in a sheet steel fixed casing, with feed opening at one side, delivering the crushed clinker at the axis of the drum. A quantity of steel balls from 2 to 5 inches in diameter are dropped into the drum through the feed opening. As the drum revolves the clinker is ground between the balls and the grinding plates. The pulverised material falls through the perforations in them on to the punched plates, which act as a first screen. The fine particles pass through the wire sieves and fall into an elevator foot or conveyor below the fixed casing. As the revolution of the mill is completed all material arrested by the screens is automatically returned into the mill and reground. The holes in the grinding plate are tapered, having the smaller orifice, about three-eighths of an inch in diameter, on the grinding surface. The wire sieves usually have 20 meshes per linear inch. The speed of the mill varies from 28 revolutions for the small sizes to 18 per minute for the largest size. The machine is economical in wear. New balls, the largest size, are dropped in at intervals, maintaining the weight of the charge.

The Tube Mill. This is essentially a finishing machine, used in conjunction with stones and ball mills. The material is fed into the mill in the form of grits, passing a sieve containing about 20 meshes per linear inch. The mill consists of a welded cylinder about 20 feet long and 4 feet 6 inches in diameter, lined with metal or steel plates, and in some cases with a special brick of a burr stone nature. The machine is horizontal, supported at either end by hollow trunnions running in strong neck bearings. The mill is driven by spur gearing on the front end at a speed of about 28 revolutions per minute. The front trunnion acts as the feed opening, the material generally being fed into the drum by a worm. The drum contains a number of flint pebbles, from 1¼ inches to 3 inches diameter, filling it to just below the level of the feed opening. The material passes slowly down the drum and is thoroughly ground by the falling flint pebbles. The back trunnion acts as a discharge, having a worm inside. The flint stones are kept back by a slotted cover at the discharge end. The product passes from the discharge orifice into a funnel-shaped screen, through which the ground cement falls into an elevator or hopper. Any flint chips which have come through the slotted guard-plate pass over the screen and fall out through a special opening. Another variety of tube mill discharges the cement through openings in the periphery of the drum, and no screen for flint chips is provided.

The Griffin Mill. This machine obtains its grinding power from an ingenious application of centrifugal force. It consists of a grinding pan in which a circular roll is suspended on a vertical shaft, the latter being connected to the driving pulley by a universal joint. The roll is thus free to swing in any direction, and the clinker is pulverised between it and a hardened ring lining the sides of the pan. Shoes or ploughs are attached to the underside of the roll to stir up the material in the pan and bring it into the crushing area. A fan is attached to the shaft immediately above the crushing roll, and surrounding the top of the pan is a wire screen. Immediately above the screen is a conical shield with an opening at the top, through which the shaft works. When the mill is running the ground material is thrown up against the screen, and, on passing it, falls through openings in the pan seating into a collecting pit. The fan draws air downwards through the cone, thus retaining the fine dust within the mill. The constant down draught also



TUBE MILL.
(Messrs. Ernest Newell & Co., Ltd., Gainsborough.)

prevents the screen meshes from becoming clogged, and assists the discharge

In a mill having a reduction ring 36 inches in diameter, a pressure of 8000 lbs. is exerted by the roll against the ring. The speed of such a mill would be from 135 to 150 revolutions per minute. For a smaller machine it would be somewhat higher.

GRIFFIN MILL.
(The Bradley Pulveriser Co., Ltd., Boston, U.S.A., and London.)

Other Machines found in Dry Mills.

As mentioned above, high-speed machines are not in favour. However, some years ago a certain pulveriser was very popular, and survivals may be met to-day. It consists of a fixed circular drum with a hardened lining, through the centre of which runs a rotating shaft. Heavy bracket pieces are keyed on to the shaft at right angles to it and are cut out at the extremities, which carry a grinding roll. Single pulverisers usually have four rolls, double have eight, and the material is ground between the revolving rolls and the drum lining. The speed of this machine is about 250 revolutions per minute.

In millstone plants rotary screens or conical separators are

common, and nearly every mill will possess a dust collector of some description. With almost every form of reduction plant a large quantity of impalpable dust is produced, which is too light to pass over with the normal discharge of the machine. A reference to the illustrations of the various grinding machines will show that practically all are provided with dust openings at the top, to which a tube leading to a collector may be attached. The tubing is either metal, or of sacking distended by cask hoopings. The collector itself is generally a wood chamber in which the dust is gradually deposited, but in some modern works, I believe, metal collectors of the "Cyclone" type are being introduced. There will also be numerous elevators, conveyors, hoppers, and spouting, nearly all of metal.

Warehouses. From the final reduction machines in the dry mill, the finished cement now passes to the Warehouse. In modern factories the transmission is usually effected by means of the mechanical conveyors, but in older works an elevated tramway on timber framing is often found. Free ventilation is provided in order that the cement may cool properly. The heat engendered in the process of reduction is considerable, and it is no uncommon thing for finely-ground cement, on leaving the last machine, to register a temperature as high as 150° Fahrenheit. The packing department will either form part of the warehouse or be in close proximity to it, and frequently in the same block will be a sack shaking and repairing room. Consequential to the packing shed are two other departments of considerable importance to Insurance Offices, viz., the Cooperage and the Sack Drying Room.

The Cooperage. This may, I think, be termed a diminishing feature in cement works. Almost all cement for the home market is packed in bags, and the same method is being adopted for export orders where the destination is not too distant. Also the export trade is declining, 1,280,000 tons being sent abroad in 1890 and barely one-half that quantity in 1904; therefore an extensive cooperage at a cement works is rather the exception than the rule. A cement works cooperage presents no distinctive features as compared with a cooperage elsewhere. It will contain one or more cask-firing hearths, a number of blocks for manual work, and probably a few wood-working machines for cross cutting, cask heading, and stave planing.

The Sack-Drying Room. For the proper preservation of cement the bags must be thoroughly dry before going to the packing shed. My own experience of cement works is limited to the last few years, but I am told that in pre-tariff days the favourite method of drying sacks was to lay them on the boiler crown and await developments. Thanks to the heavy extra rate now exigible for such performances, the sack-drying room is driven out of the main blocks and is usually located in some odd corner of the works, unwanted for any other purpose. In recently-erected factories provision for drying over steam pipes may be made, but in the older works an old drying flat, a disused kiln chamber, or an odd shed heated by flues, fires, stoves, or movable cokels will most probably be found. The sacks are usually hung on wood racks.

Disposition of Works. Having now glanced at the various processes of manufacture and features of the plant employed therein, a few notes on the general arrangement of the factory may not be out of place. It is, of course, impossible to speak absolutely definitely on such a matter, as various local considerations influence a manufacturer in laying out his works, but I think that many English works, where rotary kilns are *not* installed, will be planned on the following system:—The factory will generally be situated with a river frontage, much of the raw material being brought to the works in barges. One or more steam cranes will be found on the quay, and if the chalk and clay depositing grounds are not close at hand, an overhead wooden tramway will be run to them from the waterside. The main manufacturing buildings will be found largely in one block, having the boiler and engine houses in the centre, with the wet mill on one side, near the raw material stores, and the dry mill on the other. The kilns will be in a convenient situation for transmission of the clinker to the dry mill, and the slurry drying floors (if these are necessary) midway between the wet mill and the kilns. Where rotary kilns are in use the buildings containing wet mills, kilns, and reduction plant will form one continuous range, which will also include a coal grinding mill. The plan of a modern factory is annexed, and indicates the manner in which the material is continuously passed forward. Where the warehouse is not in actual communication with the dry mill, it will be connected thereto by conveyor or tramway as above mentioned.

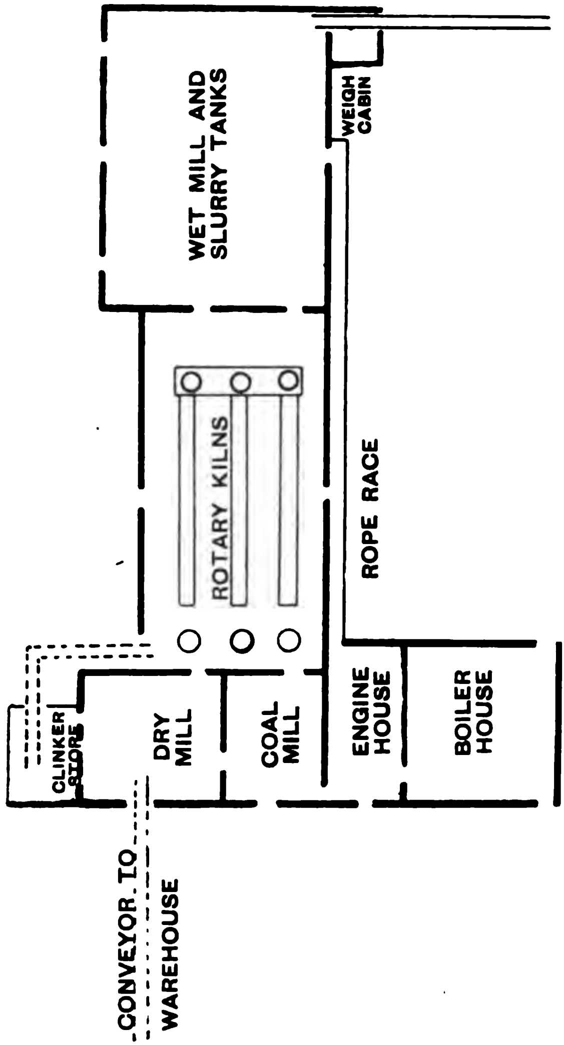
Detached buildings will comprise sack-drying room, cooperage, mechanics' shop, testing room, laboratory, etc.

In the Southern Counties, where an abundant supply of chalk is available, a lime-burning plant will often be found on a cement works premises, and at our Northern factories, where large deposits of clay are readily accessible, a brick-yard may be run in conjunction with the cement works.

Notes on Fire Hazard.

Nothing calling for special mention arises in the processes of manufacture until the drying-floors or kilns are reached. It will be remembered that practically all varieties of kilns require a working platform, which is very often constructed of timber, and closely abuts upon, if not actually supported by, the masonry of the kilns. The supports for roofs over drying-floors also almost invariably rest on the kiln masonry. Where intermittent kilns are in use considerable expansion and contraction occur every time the kiln is fired and cooled, eventually causing fissures in the supporting masonry. Should these not be immediately detected the kiln chamber itself will probably give way at the weakened points with disastrous results to any combustible material in the vicinity. Therefore, no matter how apparently substantial the kiln structure may be, the use of timber in any erections connected with it is to be strongly condemned. Of late years an improvement in this particular feature has been manifested in many works, iron and concrete being employed for new erections, and I venture to think that the manner in which wood stagings and kiln roofs are penalised by the Tariff has had not a little to do with this happy result.

The rotary kiln and its accompanying coal grinding mill undoubtedly furnish new hazards in a cement works. In one respect a distinctly good feature the plant possesses is that its size and manner of working preclude its installation in a "converted" building; a new works, or practically entire reconstruction of existing premises, being necessary. On the other hand, while its efficiency in continuous working with the dry materials customary on the Continent and in America has been fully proved, it is, I think, admitted that in successfully treating English slurry it has not yet advanced much (if any) beyond the experimental stage, and a considerable amount of temporary work and general incompleteness are often unavoidable. The kiln sheds are usually constructed of incombustible materials, iron roofs with open sides



PLAN OF MODERN FACTORY.

being inexpensive and convenient structures. Wood should be rigidly excluded from the working platforms and gangways between the kilns, as the heat radiated is considerable, especially at the lower or combustion end. Any wearing away of the fire-brick lining, which is only 9 or 12 inches thick, would speedily lead to the metal cylinder becoming red hot, if an actual collapse did not take place.

Certain grave dangers are present in the coal mill. The liability of finely-divided particles of coal to violent ignition and explosion, and the tendency of coal dust when stored in mass to spontaneous combustion, are well known facts in Insurance chemistry. The danger of a metallic grinding surface striking a spark from impurities present in the coal, would lead one to prefer slow-speed reducing machines. The drying arrangements require special attention, and no effort should be spared to secure efficient dust collection. The stock of ground material should be kept as low as possible, and in no circumstance should any naked light be allowed in the mill. These are some precautions that suggest themselves, but it seems to me that, even under the best conditions, the introduction of a coal-grinding plant means a serious increase of risk.

Several of the most serious fires in cement works have occurred in the dry mill, a building in which at first sight the hazards may not be very apparent. Usually the mill is of approved construction, and, when designed for stone grinding, two storeys in height. The intermediate floor is generally wood, sometimes steel and concrete. The ground floor contains a horizontal shaft, coupled direct to the engine, and the gearing for the stones, which are located on the top floor. A building specially designed for ball and tube mills will usually be a lofty shed, with a certain amount of wood staging round the mills. In the average mill the first thing that strikes one on entering is the large quantity of dust in the air, and in this dust may be found the exciting cause of many fires. In itself the dust is absolutely harmless, being, indeed, very finely-ground cement, and, so far as I can learn, incapable of combustion or explosion. It, however, collects on all the bearings, adhering to the overflowing lubricant. Should the system of lubrication become imperfect, and the dust enter the bearing itself, great frictional heating will ensue, owing to the heavy nature of cement-grinding plant.

Artificial heating is the exception rather than the rule, though in pre-Tariff days pipe stoves and portable fires were fairly common.

Gas is a satisfactory illuminant where it can be obtained, but for many country factories it is not available. Paraffin lamps will generally be found here, and in stone grinding mills portable lights are used by workmen in charge of the stone gearing. Acetylene gas has been successfully used for lighting country works.

Steam engines are generally employed for power purposes, though gas power has been satisfactorily introduced in some cases. Electrical power and lighting systems are common in America, but rare here. To my mind several serious objections can be urged against their introduction into this class of risk. The omnipresent dust would be liable to penetrate into the working portions of motors, and the regulating gear of arc lamps. Rheostat and switch contacts of ordinary types would speedily become foul from the same cause, and heating ensue. In view of the vibration from the heavy grinding plant, the wiring would require to be most carefully run. Moreover, as the average speed of an electric motor is at least three times that of any ordinary dry mill plant, further gearing would be necessary. I have before me particulars of an installation in an entirely new factory where three-phase induction motors are employed, but special reference is made to the fact that the dust-collecting arrangements are most complete. Before sanctioning an installation to supersede other modes of lighting or power in old works, special expert advice should be taken.

The remaining buildings do not call for extended notice. Warehouses are usually lofty sheds; the lower part of the walls, forming the sides of bins, is of substantial construction, but the upper part is often timber or iron, and wood louvred ventilators in the roof are common. The hazards incidental to cooperages and sack-drying rooms are fairly obvious. It may, however, be said that a mess room is often near the sack-drying room, and the latter is a favourite spot for an after-dinner pipe.

Effect of Tariff Legislation.

A tariff for cement works has now been in operation for some ten years, and several improvements in risk may, I think, be placed to its credit. At all events, certain objectionable features, in respect of which additional charges are exigible, and which a decade ago were in strong evidence, have been practically

eliminated. The improvements may be summarised as follows, viz:—

1. The cooperage and sack-drying room have been driven into buildings detached from the main block.
2. Additional buildings are of approved construction.
3. New kiln sheds and stagings are now being constructed of incombustible materials.
4. The more objectionable methods of artificial heating and lighting have been discontinued.
5. The feed spouts, hoppers, and elevators in dry mills are now all of metal construction, whereas at one time wood was extensively used for this purpose.

As regards high-speed machines, it would appear that their disappearance is due rather to the heavy repair bills than to the extra charge entailed by their use. The provisions of the Tariff have been but slightly altered since its adoption, but perhaps we may now have legislation in regard to rotary kilns and coal-grinding plant.

My thanks are due to Messrs. Edgar Allen & Co., Ltd., Sheffield; The Bradley Pulveriser Co., Ltd., Boston, U.S.A.; The F. Krupp Co., of Madgeburg; Mr. H. R. Marsden, of Leeds; and Messrs. E. Newell & Co., Ltd., of Gainsborough, for blocks and catalogues of cement machinery; to several manufacturers, both here and in the South, for the assistance given in collecting information for this paper, and for samples shown to-night; to our Honorary Secretary and the local Assessors for the assistance given in compiling the annexed fire list; and, lastly, to you, gentlemen, for the patience with which you have listened to my remarks.

FIRES IN CEMENT WORKS,

1897 to 1905 Inclusivi.

Date.	Place.	Time of Outbreak.	Part of Works in which Fire Started.	Cause.	Loss.	Remarks.
					£	
17th April, 1897.	Hull.	4.15 p.m.	Dry Mill.	Unknown.	2,664	
28th August, 1897.	Hitchin.	10 p.m.	Empty Cask and Sack Store.	Spark from Engine or Tramps.	6,600	Fire extended to Warehouse and Dry Mill.
1st September, 1897.	Halling, Kent.	9.30 p.m.	Dry Mill.	Friction in Edge Runners.	1,686	Total damage, £3,818.
4th December, 1897.	Sheprek, Cambs.	6 p.m.	Dry Mill.	Unknown.	540	
7th March, 1898.	Newark.	12 p.m.	Engine House.	Oily Waste.	28	
6th April, 1898.	Gateshead.	11 p.m.	Crane on Quay.	Unknown.	30	
27th July, 1898.	Hitchin.	7 p.m.	Oil and Brass Store.	Match thrown down (probably).	10	
20th August, 1898.	London.	——	——	Fire in adjoining premises.	8	
11th February, 1899.	West Hartlepool.	6.50 p.m.	Dry Mill.	Hot Clinker in Wood Hopper.	380	
25th March, 1899.	Gateshead.	11 p.m.	Kiln Staging.	Crack in Kiln Masonry.	25	
7th May, 1899.	Hull.	7.30 p.m.	Dry Mill.	Hot Clinker in Wood Hopper or Friction in Bearing.	370	
8th January, 1901.	—— Kent.	6 p.m.	Test Room and Store.	Lamp Explosion.	1,100	
17th October, 1901.	Jarrow-on-Tyne.	——	Jetty.	Unknown.	25	
18th January, 1902.	Bristol.	——	Kiln Staging and Shed.	Defective Kiln Flue.	95	
11th July, 1902.	West Hartlepool.	3 a.m.	Dry Mill.	Friction in Bearing.	778	Total damage, £1,310.

22nd September, 1902.	Wallsend-on-Tyne.	11.45 p.m.	Kiln Staging.	Coke under Staging Igniting.	60	
29th January, 1903.	Goldenbridge, Co. Dublin.	11.30 a.m.	Engine House.	Lamp left under Wood Floor.	128	
25th April, 1903.	Thrumpton, Notts.	4.30 p.m.	Boiler House.	Damper lowered too far.	8	
1st May, 1903.	Gateshead.	9 p.m.	Dry Mill.	Friction in Bearing.	3,260	Total damage, £3,500.
12th May, 1903.	Jarrow-on-Tyne.	———	Crane on Quay.	Unknown.	30	
31st May, 1903.	Sunderland.	———	Kiln Roof.	Fire from Crack in Kiln.	6	
17th August, 1903.	Sunderland.	3 a.m.	Kiln Roof.	Explosion in Kiln.	2	
10th October, 1903.	Wallsend-on-Tyne.	3 p.m.	Cooperage.	Spark from Wherry on River.	12	
3rd January, 1904.	Hull.	6 a.m.	Engineers' Office.	Defective Stove.	195	
21st February, 1904.	——— Sussex.	———	———	Unknown.	2,176	
8th March, 1904.	Gateshead.	11 p.m.	Warehouse.	Unknown.	15	
5th June, 1904.	Halling, Kent.	———	———	———	10,000	Newspaper account only available.
28th December, 1904.	Hebburn-on-Tyne.	9 p.m.	Warehouse.	Unknown.	3,100	
7th January, 1905.	Porthkerry West, Glamorgan.	Night.	Boiler House.	Defective Flue.	10	
19th February, 1905.	Queenborough, Kent.	———	———	Ignition of Fluff.	350	
3rd May, 1905.	Halling, Kent.	———	———	Lamp upset.	900	
2nd August, 1905.	Hull.	7.50 a.m.	Dry Mill.	Workman's Lamp used in examining Heated Bearing.	320	
31st August, 1905.	Grays, Essex.	8.45 p.m.	Cooperage.	Tramps (probably).	2,161	
12th October, 1905.	Barrow-on-Soar, Leicester.	11 a.m.	Dry Mill Block.	Workman fouling Oil Engine.	950	
28th October, 1905.	——— Kent.	2 a.m.	Wet Mill.	Unknown.	200	

MOTOR CAR WORKS.

By G. K. DIXON (Alliance Assurance Company).

A Paper read before the Insurance Institute of Birmingham, 9th March, 1906.

Preface. In accordance with the invitation of the President of the Birmingham Insurance Institute, the writer submits the accompanying notes on this subject, at the same time laying no claim to the technical knowledge of the motor engineer or the theoretical principles of automobilism.

With the hope that the notes may be of some little use to such of the Institute's members as have not already become acquainted with motor works, an imaginary tour is outlined, and an attempt made to follow the building of a motor car through its successive stages.

The advent of the automobile brought with it many problems of which much is written in the public press. To the Insurance world it brought a class of risk which, while combining the features of many already familiar, is distinctive in the way these features have become assimilated, until we are almost deluded into looking upon them as applicable or indigenous to motor car works only.

To make up his own volume the motor car manufacturer has culled the best leaf out of the book of many other trades. By improving on their methods and employing the best of materials and workmanship, he has created his own special industry.

The metal trades have furnished casting, forging, tin and coppersmiths' work, brass work, tool-making, engineers' and machinists work.

The wood-working trades have supplied pattern-making, carpentry, joinery, cabinet-making, coach-building, and wheelwrights' work, whilst upholstering, coach-finishing, electrical work, rubber and lamp-making all have rendered their quota.

These, however, do not exhaust the calls made on other trades; in fact, a distinct fillip has been administered in directions that at first blush might be considered outside the possibility of his influence, and the tailor, dressmaker, and shoemaker have each felt the impulse of the new industry.

For materials the world has been ransacked from end to end; the best that money and experience can command have been gathered in to minister to the needs of the motor manufacturer.

The result of this combination of skill and material is the expensive and ubiquitous motor car, the terror of the pedestrian, wheelman, and horseman, the slayer of stray dogs, cats, and fowls, the destroyer of public roads, and the source of much pleasure and some fear to its owner.

The element of its utility is also the menace of its life. The petrol which provides the means of progress may be the cause of its destruction. A loose screw, an extra strain or a sudden jar, and the costly toy becomes enveloped in a mass of flame, resulting in complete destruction or at least in serious damage. Nor is this liability to "self-destruction" confined to the motor on the road; cars have committed "suicide" in the garage after having been left apparently safe.

Manufacturers say that the weak point is at the junction of the supply pipe from the petrol tank with the carburetter, and that a leak or a fracture there results in the petrol becoming ignited and firing the lubricating oil, of which there is a large quantity used to obtain the smooth running of the machinery.

The petrol tank itself they claim to be innocuous, and to have been found intact, with the petrol in it, on cars that have been badly burnt. Be that as it may, the risk of fire remains, and will still remain until some less inflammable medium than petrol comes into vogue.

Briefly, the petrol motor may be described as a quick-running engine, the propelling power being provided by the ignition of a mixture of petrol vapour and air, roughly one part of the former to nine of the latter. The gas produced by this ignition or explosion acts on a piston in a cylinder which drives a crank shaft, and so to the gear.

Motor Car Works. Ideal conditions from the Insurance point of view are seldom met with during the development of a new trade, and this may be said to especially apply to motor car works.

Generally speaking, this trade is carried on in buildings which have been altered and adapted to the purpose, rather than built for it, with extensions and additions made as the business has developed. Consequently it is difficult to give a description of a motor car works that would be useful as a model or standard to judge others by.

One striking feature, and perhaps the outstanding feature, is the multitude of separate parts that are completely made before the car itself begins to take shape.

The number of drawings for any one type approaches two hundred. These are reproduced by "blue prints" for the use of the various departments, and wherever one goes he finds these plans.

Following the idea of a tour through a motor car works, after visiting the drawing and designing office the pattern shop claims attention. Here wooden patterns for the castings are made. They are many in number and intricate in workmanship. In one case some half-dozen men were employed for six or seven weeks on the pattern for a new model engine. Lathes, saws, boring and planing machines, and patternmakers' benches are in evidence, and the risk may be classed as a heavy one. Next comes the foundry, with its core stoves and cupolas, where cylinders and fly-wheels of cast iron are produced. Then the casting shop, with core stoves and crucible furnaces; here brackets of malleable iron, gear cases, back axles, and motor castings in aluminium, and gun-metal and brass castings are turned out.

The blacksmiths' shop, fitted with hearths and power hammers, is responsible for brackets and shafts forged in steel.

In the hardening shop are muffles and furnaces, with baths of whale oil for case-hardening parts and tempering tools.

The general machine shop should now be visited. Here are automatic and capstan lathes, and machines for milling, slotting, drilling, planing, and grinding the castings and other metal parts, which are taken on completion to the motor fitting-shop. In the latter the engine is put together, the greatest nicety being necessary to get the various parts to fit and act in harmony one with the other.

Following this the motor testing shop, where the completed engine is fixed on a stand and driven by petrol under conditions as near to actual running as possible. Some little machinery may be found in this shop to enable the men to make small adjustments to the engines. The risk of fire in this shop is fully recognised, and special precautions are insisted upon.

Now to the chassis erecting shop, where the future car takes its first shape. The pressed steel frame is erected, and the engine, gearing, and, in fact, all the metal parts are fitted and adjusted. Some woodwork, such as side ribs and dash boards, is added, and the tinsmiths' and coppersmiths' work, including the petrol tank, water circulating details, radiators, and the electrical work for the ignition fixed. The wheels are mounted, and the chassis is ready for the painting shop. Here such parts as require it are painted, and this may be said to complete the metal-working part of the manufacture.

From the painting shop the chassis is taken to the running shed, the tank is charged with petrol, and the practical life of the car begins. Trial trips are run, and the whole of the mechanism is thoroughly tested under working conditions.

The wood-working shops now claim attention. First, the body-making shop, where carpenters are at work at what may be described as coach-building. American white wood, ash, elm, mahogany, and fancy woods are used, and in some works sheet metal is employed for the bends. Wheels are built of hickory spokes and ash felloes, with steel rims shrunk thereon.

Circular saws, band saws, boring machines, spoke lathes, planing machines, wheel cramps, and other machines are in use; many benches, and, in some cases, steam chests for softening timber may be found. Cabinetmakers work on the interior fittings, and the body is prepared for the body-fitting shop. In this latter the bodies are fitted on the chassis, the smaller woodwork is completed, and everything made ready for the final work of the upholsterer and finisher.

In the upholstering and finishing shop, the seating, back and sides, are padded, the hoods and the trimmings put on. The materials used include leather, American cloth, linen, wadding, horsehair, and felt; a few sheets of celluloid and a tin or two of naphtha solution will also be found.

Rubber mats, treads, and tyres are fitted, and any final touching-up done.

The painting and varnishing are finally done, and the car is ready for the showroom.

Other parts of the works are the toolmaking shop, where machines for working in metal are in use; the millwrights' shop, where the repairs and coustruction of the plant are done; plating and polishing shop, sand-blast place, and stores for the various workshops and departments. A repair shop also may be found, and showrooms are included in the larger works.

No special reference is necessary as to the motive power in the works, steam engines, gas engines, or electro-motors being found, the latter, owing to economy of space, perhaps being the favourite.

The above description follows the lines of what may be called a model works, covering a very large area, the buildings being substantially built and the heavier risks isolated; generally speaking, all of one storey, and ample ground for future extension available.

These conditions, however, are not always found. No doubt many present to-night have visited works where most, if not all, the processes are carried on in a single building; others, again, in two or three separate ones.

Given satisfactory heating and lighting arrangements, careful management and isolation of the heavy risks, there still remain many elements of risk for consideration.

Petrol.—This is used for testing the engines, testing floats, and sometimes for cleaning purposes. The first should be done in an isolated building used for that purpose only, the second either confined to the smallest proportions or done outside the main risk, and the last absolutely forbidden.

The tanks on the cars should not be emptied or filled in any of the workshops, but in the open air or in a glass-roofed yard. The running shop, however, is the exception to this rule.

The petrol store should be completely isolated.

Naphtha Solution.—This is used in the upholstering department for making water-proof joints, and should be limited in quantity and kept in suitable tins.

Paints, oils, and varnishes should be obtained from their stores as required, and the stores should be for that department only, not combined with others.

Machinery oils for the works should be in patent drums, constructed to prevent dripping on the floors. Inspection pits in

the chassis erecting shop, running shop, and repair shop should be kept clean, and no lights other than incandescent electric lamps taken into them.

Shavings and other debris should be removed from the shops every night. Oily wipes and waste should be placed in metal cans or buckets, to be taken out of the works periodically.

Patterns should not be allowed to accumulate in the foundry or casting-shop.

Floors should be swept up and all rubbish removed outside daily.

Motor car works will always be heavy risks, calling for the greatest care on the part of the insured and the insurer, and no reasonable precaution should be neglected to minimise the risks. Up-to-date appliances, with adequate water supply, should be provided. Fire buckets, chemical extincteurs, large quantities of salted sand and wet blankets liberally provided, and the employees thoroughly drilled in their use.

No useful purpose would be served by detailing the rates charged for any particular works, or by attempting to make comparison between the rating of two or more.

The special features of one may be absent in the next, the processes more mingled together, and the buildings less adapted to the uses to which they are put. For instance, take four cases:—

A. All one building; the business in its infancy; under 50 hands employed.

B. Similar as regards the premises, but doing a large and increasing trade; perhaps four times as many hands employed, and an unavoidable tendency to congestion in every department, owing to there being no available land for extending the buildings.

C. A well-established works covering a large area, with extensions being made; but these extensions take time, and whilst they are in course of completion the old portions are without relief from the inevitable overcrowding caused by the rapid development of the business.

D. The up-to-date, flourishing works, designed from the experience of the past; all the departments in their separate shops, heavy risks isolated, and the managers fully alive to their responsibilities from both the manufacturers' and the Fire Insurance point of view.

It would be manifestly unfair to rate any one of these other than strictly on its merits.

Although not strictly within the limits of the title of this paper, a word may be spoken on the risks of the Motor Garage.

The private owner of a car generally utilises a coach-house or other outbuilding, with a wooden floor for choice, smokes his pipe or cigarette whilst fussing about his car, and has the profound contempt bred by familiarity for all the dangers attaching to his hobby. He has a notion that he of all others will be exempt from any trouble or accident, and wonders why he should pay more than 1s. 6d. per cent. for his insurance.

The public garage is not usually a model fire insurance risk. The buildings have, in few instances only, been built for the purpose, and even in these instances the construction often is of a flimsy character.

Dirty floors and inspection pits, careless handling of petrol, lubricating oils, and carbide, all conspire to add their little quota to the risk, whilst there is always the danger of a defective car being brought in to help matters in this direction.

Losses.—On this point it would be more instructive if complete details were available; but although the Hon. Secretaries of the various Institutes have favoured the writer with all the details at their command, it must reluctantly be confessed that the accompanying list shows only a small portion of the claims that the Companies have met during the past 10 years.

[TABLE.

Table A.—Cars, &c., in the Open.

Vehicle.	Where loss occurred.	Cause of Fire.	Amount of Loss.
			£
Motor Car.	Stable Yard.	Defective supply pipe.	450
Do.	Public Road.	Do.	120
Motor Cycle.	Do.	Do.	9
Steam Car.	Do.	Do.	30
Do.	Outside of Garage.	Fire box flooded with petrol.	42
Motor Car.	Public Road.	Supply pipe broken.	50
Do.	Do.	Leakage of petrol.	150
Do.	Do.	Do.	27
Do.	Do.	Do.	9
Do.	Do.	Do.	220
Motor 'Bus.	Do.	Collision.	130
Motor Car.	Do.	Leakage of petrol.	100
Do.	Do.	Do.	4

Table B.—Motor Manufactories.

Damage to	Cause of Fire.	Amount of Loss.
		£
Car in Motor Works.	Motor firing.	10
Do.	Overhauling.	22
Do.	Taper.	54
Stock in Motor Works.	Carelessness.	475
Building of Motor Works (Stock loss not obtained).	Unknown.	2,050
Building and Contents, Motor Works.	Unknown.	4,900
Motor Cycle in Motor Works.	Petrol.	13
Stock, &c., in Motor Works.	Leakage of petrol.	2,500
Do.	Oily waste.	79
Motor Car in Motor Works.	Testing.	240

TABLE C.—REPAIR SHOPS.

Damage to	Cause of Fire.	Amount of Loss.
		£
Motor Cycle in Repair Shop.	Testing.	20
Do.	Spark.	15
Building and Contents of Repair Shop and Garage.	Carlessness.	1,238
Do. (Petrol tanks on vehicles exploded violently).	Adjoining premises on fire.	2,500
Motor Car in Repair Shop.	Vapour in Inspection Pit.	20
Stock, &c., in Repair Shop.	Lamp.	186

TABLE D.—DEALERS' PREMISES.

Damage to	Cause of Fire.	Amount of Loss.
		£
Motor Cycle in Showroom.	Leakage.	18
Stock, &c., in Dealer's Premises.	Unknown.	1,900
Do.	Electric Wire.	2,000
Do.	Match struck whilst tank was being filled.	2,100
Motor Cycle in Dealer's Premises.	Leakage.	20
Motor Cars in Coachbuilder's Premises.	Unknown.	347
Other Stock in Coachbuilder's Premises.	Unknown.	5,000

TABLE E.—PUBLIC GARAGES.

Damage to	Cause of Fire.	Amount of Loss.
		£
Motor Cars, &c., in Public Garage.	Carelessness of owner of car therein.	2,000
Motor Car in Public Garage.	Oil igniting.	10

TABLE F.—PRIVATE GARAGES.

Damage to	Cause of Fire.	Amount of Loss.
		£
Motor Car in Private Garage.	Leaking petrol.	25
Do.	Do.	13
Do.	Light thrown down.	125
Do.	Unknown.	465
Motor Car, &c., in Private Garage.	Do.	350
Do.	Do.	546
Motor Car in Private Garage.	Leakage of petrol.	200
Do.	Do.	35
Do.	Light thrown down on oily floor.	1,200
Do.	Incendiarism.	100
Do.	Petrol fumes.	470
Do.	Filling tank.	75
Do.	Gas stove.	300
Do.	Oily waste.	225
Do.	Flexible gas pipe.	10

From these details it will be seen that the bulk of the losses occurred through defects in the vehicles, whilst the "Unknown" is responsible for most of the heavy claims.

In conclusion the writer would say:—Beware of the man who "Knows all about petrol." He probably knows little, and his confidence in his own knowledge will sooner or later prove his undoing.

Many thanks are due, and are here tendered, to the Hon. Secretaries of the various Institutes, and to the Loss Assessors who have combined with them in furnishing the details of the claims that have come under their notice.

GUARANTEES AND TREATIES.

By WILLIAM BLAIR.

A Paper read before the Insurance Institute of Bristol, 24th March, 1905.

My subject, "Guarantees," is a very wide one, and one which is hardly capable of being dealt with in the compass of a single paper in its many and varied aspects. To-night I do not propose, therefore, to enter into any lengthened exposition of the guarantee rules, but rather to call your attention to the practical application of these rules, and to give a few illustrations as to how they work out in actual practice. In connection with this there is also the other question on which I should like to say a few words, and that is the question of Treaties, which is now a great part of the general guarantee system.

It has often been stated that the guarantee rules bear somewhat heavily on the guaranteeing Office as distinguished from the insuring Office, and there is no doubt that this is so. This grievance is one which is often given expression to by our many foreign friends who transact guarantee business in our midst. It must be borne in mind, however, that the British Offices who frame these rules are all guaranteeing Offices themselves, and consequently the position is not quite so one-sided as it might appear at the first glance.

Taking some of the principal guarantee rules as they come in the list, I think the first one calling for special mention is that relating to an acceptance given by an Agent or Branch Official. Such acceptance is, as you are aware, subject to Head Office confirmation, and if no exception be taken to the acceptance within seven days, then the guarantee is to be deemed absolute. In branch centres generally such a rule is well understood, but in London, where guarantee men are accustomed to deal with Head

Offices, this rule has to my own knowledge brought trouble upon not a few guarantee clerks. There are several Companies which have their head-quarters in the provinces, and consequently an acceptance given by these Companies at their offices in London becomes subject to this rule, hence the necessity of every care being exercised to see that the guarantees are all absolute acceptances before the direct department is allowed to commit the Company to a large insurance.

The question of renewal lists is one which gives rise to many serious misunderstandings. Of course, in the matter of the ordinary quarter-day guarantees the practice is simple enough, and there is very little room for any mistake to occur. It is when dealing with the annual non-quarter-day guarantees, not short-term guarantees, that complications are apt to crop up. The practice of Companies with regard to the renewal of such policies is not uniform. Most Offices renew an annual non-quarter-day policy by issuing a new document, but there are a few Companies who renew such policies by an ordinary renewal receipt. The guarantees follow the renewal of the policy in either case. In the former instance, where the renewal is effected by the issue of a new policy, the usual procedure with regard to renewing the guarantee is by the issuing of a fresh request note. In the latter instance, when the renewal of the policy is effected by the issue of a renewal receipt, the renewal of the guarantee is usually effected by including it in the ordinary quarterly list which is the most convenient according to the date of its expiry. For instance, the renewal of a non-quarter-day guarantee following a policy expiring on the 21st June would be included in the Midsummer renewal list. In the absence of definite advice from the insuring Office, it is never safe to assume that a non-quarter-day guarantee is cancelled. The insuring Office would be well within its right in sending out a fresh request note for one of these guarantees even three months after the date of the renewal. It has sometimes happened that agents have granted renewal of such policies, and have never advised their Offices of same until they render their quarter-day accounts. In the case of a Company renewing a non-quarter-day policy by renewal receipt and treating the renewal of the guarantee precisely the same as an ordinary quarterly one, the guaranteeing Office would not know of its liability until it received back the renewal list, which is seldom returned within two months of the quarter-day to which it refers. Thus the

advice of the renewal of an annual non-quarter-day guarantee expiring, say, on the 1st September, and renewed through the quarterly renewal list, which in this case would be the Michaelmas one, would not reach the guaranteeing Office until well on in December. The only safeguard the guaranteeing Office has is by issuing monthly lists of all non-quarter-day guarantees, getting the insuring Office to mark them up and return them within a reasonable time. Under no circumstances is it safe for a guaranteeing Office to cancel one single non-quarter-day guarantee on its books until it has received from the insuring Office definite advice of its cancelment. Before I leave this question of renewals, a word about cancelments may not be inopportune. It has been held that where an insuring Office has decided that a guarantee will not be required after its term of renewal, in consequence of the Office having resolved to retain the risk, or to re-insure it elsewhere, intimation should be given to the guaranteeing Office not later than the term of renewal, otherwise the guarantee is to be held in force. I remember hearing of a very interesting arbitration which arose some years ago between two Offices with regard to this very point. "A" resolved to replace all the guarantees which it had with the other Company "B," and commenced operations with the Midsummer quarter, making a clean sweep of every guarantee on the list. "B," however, was not advised, "A" simply contenting itself by marking all the guarantees as cancelled on the renewal list, which was not returned to "B" until about the end of August. When the latter, observing that all its guarantees were cancelled, immediately asked "A" whether all their insurances had lapsed or not, "A" replied that this was no concern of "B's," adding that all that "B" had to do with was that its guarantees were no longer required. Matters speedily reached a deadlock, and the case was referred to arbitration. After the subject had been fully discussed, the decision was given in favour of the guaranteeing Office "B," and the insuring Office "A" was ordered to pay consideration for "time on risk" to the guaranteeing Office on all the guarantees belonging to that quarter which followed policies that had been renewed, the "time on risk" to be calculated from Midsummer to the date in August on which the renewal list was returned to the guaranteeing Office.

Another important point with regard to cancelments is that no cancelment can be dated back. A guaranteeing Office has a

perfect right to insist on being paid consideration for "time on risk" up to the date on which it receives notice that its protection is no longer required.

In this connection it may be asked how often is a guaranteeing Office advised *at the time* in cases where an increase of rate is decided on, or when an insurance is declined at renewal. I fear this duty is one which is very often neglected by the insuring Office, and as a consequence the guaranteeing Office not infrequently accepts an amount at current price from another Company as a transfer, quite innocent of the action taken by the insuring Office.

It has often been stated that during the term of an insurance the guaranteeing Office is bound hand and foot to the insuring Office, and there is no denying this fact when you come to apply the rule with regard to alterations in the insurance. A risk during the mid-term of a policy may be altered in such a manner as to become, in the opinion of the guaranteeing Office, quite uninsurable. In fact, it might be converted into an explosive manufactory, the insurance on which might be quite contrary to some article in the constitution of the guaranteeing Office; but so long as the insuring Office is pleased to continue its protection, the guaranteeing Office has no alternative but to follow. It can only ask for relief as a favour, and not as a matter of right. Of course, if the insuring Office reduced its retention on account of increased hazard, or from any other cause, the guaranteeing Office has the right to ask to have its guarantee reduced in similar proportion.

Alterations involving change in locality are likewise binding on the guaranteeing Office, provided it has no liability on the new premises. But if the guaranteeing Office have any existing liability in or on the new premises for a less amount than the sum named in the guarantee, it shall only be responsible to the insuring Office for the difference between its already existing liability and the sum named in the guarantee. In the event of the guaranteeing Office being already interested in the new premises to the full extent of its guarantee, then the said guarantee shall be of no effect. In this connection it may be of interest to recall a case involving change of locality where a fire took place with consequences very favourable to the insuring Office. An insuring Office issued a policy on personal property in a Pantechnicon for £4,000, of which it retained £400 for its own account, and

reinsured the balance of £3,600 with various Offices, no Company having more than £400. Of course, the Company in question held large amounts in other names. The property was removed from the Pantechnicon to a private dwelling-house, and before it had been in the dwelling-house 36 hours it was totally destroyed by fire. The guaranteeing Offices were not advised of the alteration, neither were they advised that their protection was no longer required. Had there been no fire, this latter course would certainly have been adopted, as the insuring Office would have retained the whole sum for its own account. After the fire, however, the insuring Office advised the guaranteeing Offices of the loss, and recovered £3,600 from them, its own nett loss being no more than £400. A few of the guaranteeing Offices felt annoyed about being let in in this way, but they could not help themselves. It is the fortune of war, and is quite in order so far as the guaranteeing rules are concerned. One more illustration before I leave this subject, which I think bears very much harder on the guaranteeing Offices than the case I have just quoted. An insuring Office, we will say, issues at different times two policies on the contents of a certain warehouse, being both annual non-quarter-day policies, the first being taken out on the 10th February, and the second on the 3rd November. The insuring Office retains its full limit out of the first policy, and when it receives the order for the second policy it reinsures the whole of the latter. The policy expiring on the 10th February is allowed to lapse, and before the insuring Office had rearranged its guarantee so as to keep its retention out of the policy expiring in November, the warehouse is burnt to the ground. The whole of the policy being reinsured, the insuring Office, under the circumstances, can recover every farthing of its loss from its guaranteeing Offices. I have come across many who think that such a thing is impossible, but I know on good authority that it has actually taken place, and is not at all contrary to the guarantee rules, however hard it may be on the guaranteeing Offices. Many offices, in order to protect themselves against such an occurrence, make it a condition that the insuring Office shall retain for its own account a sum at least equal to the amount ceded out of the *identical* policy.

I recently heard of an interesting discussion as to whether a guaranteeing Office has the right to assume that the insuring Company's retention, as stated on re-insurance slip and request note, is by the identical policy unless otherwise mentioned. It

was maintained that in framing the guarantee rules such was the intention, as the insuring Company's holding is the principal guide as to the eligibility of a risk for guarantee acceptance, and should, therefore, be a permanent factor and not liable to fluctuation owing to lapsing or getting rid of other policies. Of course, if it is stated on the request note or re-insurance slip that part or whole of the retention of the insuring Office is by other policies, then the guaranteeing Office in accepting an amount does so with its eyes open. While admitting that some Companies give effect to this view, in many cases it must be recognised that in placing re-insurances, especially on mercantile risks, it is certainly a dead letter. I hold that as the rules stand a guaranteeing Office has no right to make such an assumption as I have named. All that the rule provides is that the retention of the insuring Office on the identical property at the time of effecting re-insurance should be given. There is something to be said, however, in favour of a slight alteration in the rule governing this point.

Since I commenced the preparation of this paper, an interesting arbitration case has been brought to my notice which arose many years ago, long before the guarantee rules took their present shape. An insuring Office was interested on a certain risk, the rate for which had been 5s. per cent., but was, owing to competition, reduced to 3s. 6d. per cent., and in consequence of this it was decided to reduce the limit. In effecting the guarantee, however, the insuring Office quoted the old rate of 5s. per cent., which appeared on the policy copy, instead of the reduced one of 3s. 6d. per cent. The guaranteeing Office received the copy of policy at the correct rate of 3s. 6d. per cent. at the same time that a fire occurred. They raised the question of their liability as follows:—

"They never accepted such risks at less than 5s. per cent., "therefore if the insuring Office had not made the mistake they "would not have accepted the risk at all, and so would have "escaped the loss."

They offered to make an *ex-gratia* payment, which was not accepted. The case went to arbitration, and the decision was that the insuring Office had to pay the guaranteeing Office consideration at 5s. per cent., and the guaranteeing Office had to pay the loss.

Up to about 20 years ago the rules used to read that in case of a difference between any two Offices the arbitrators were to

interpret the rules as an honourable agreement between the Offices rather than as a legal obligation. In fact, the whole idea of guarantee business rested on a basis of good faith.

Gentlemen, I think I have taxed your patience quite enough with regard to the guarantee rules; but before I pass on to the question of "Treaties," I should like to say one word as to the recent recommendations of the "F.O.C." with regard to guarantee transactions. The adoption of standard forms for documents is a much-needed reform, and is one which will greatly facilitate the work of a department like the guarantee, where there is such an enormous mass of detail to be got through.

It is a very high compliment which has been paid to the Office you have the honour of representing, Mr. President, that its forms should have been selected as the specimens for our common use.

I now come to the question of treaties, which might almost be said to be more important than that of guarantees, seeing that so much home re-insurance is now effected through this channel. I think if one were to hazard an opinion as to what proportion of home re-insurance is now done by treaty, he would not over-estimate the figure if he put it down at five-sixths of the whole. Nowadays every Company has its treaty Office or Offices, more often the latter than the former. This increase, enormous increase, in treaty business may be said to have taken place within the past ten years. It is due to various causes. The numerous amalgamations which have occurred every year have no doubt played their part in driving Offices into foreign fields to find accommodation for their surplus lines. If British Companies had to rely solely upon the home re-insurance market to absorb their surpluses, I am afraid that we would be unable to deal with the whole insurance on many of our largest risks. Even with all the treaty facilities which at present exist, there are a good many risks in the United Kingdom where it is necessary to have recourse either to "Lloyd's" or to Continental Companies doing direct business, in order to get them fully covered. This is a difficulty which, I fear, will go on increasing, as he would be a bold man who would say that we have seen the last of amalgamations. Another reason for this marked development in treaty re-insurance is no doubt to be found in the harassing and pettifogging manner in which many home Offices have been in the habit of conducting their guarantee business in the past. Offices have accepted risks one year to decline them the

next, and unfortunately re-insurers have not always been over-scrupulous in the use made of the information which they have obtained of the business of ceding Offices. Offices, therefore, have had to look around and seek for other re-insurance outlets, hence the present condition of things, which some of us do not greatly care for.

A word as to the method of working treaties. Treaty transactions, as you are aware, are not governed by the guarantee rules, but by a special set of rules drawn up for each particular treaty, embodied in an agreement which is signed and sealed by the contracting parties. This agreement sets forth all the conditions regulating the cession of re-insurances. It contains information on all the following points:—

1. The method in which the treaty Company's liability commences, which is usually effected by entering the re-insurance in a book kept for the special purpose.
2. The proportion which the treaty Office accepts of the ceding Office's retention.
3. The manner in which renewals, endorsements, and cancelments are to be treated.
4. The lines upon which fire losses and accounts are to be settled.

Treaties usually contain an arbitration clause in case of differences arising as to their interpretation, as well as a clause setting forth the manner in which a treaty can be cancelled.

In short, each treaty may be said to be a law unto itself, inasmuch as it contains a complete set of guarantee rules for the regulation of all business which comes within its scope.

There is much to be said in favour of treaty re-insurance. It frees the insuring Office from the worries, troubles, and uncertainties I have already named of facultative guarantees. It enables an Office to accept a large amount on any risk at a moment's notice. If the risk is indifferently rated, the Office can still accept, as the treaty Offices have no right of rejection, and with the high rates of commission which are paid for treaty business, the insuring Office gets a good rate on its own retention, and has a fair chance of making a profit on business which it knows perfectly well would never yield any such result at the rates obtained for it. When some fine point arises in connection with the application of

an extra under some tariff or other, how convenient it is to be able to give the assured the benefit of the doubt. An insuring Office has not to submit its action to some keen-eyed competitor, who might not acquiesce in its interpretation of the tariff. How useful it is to have abundant re-insurance facilities in the shape of treaty Offices. They ask no questions, and, like dead men, they tell no tales. When some enterprising broker comes along with an extra-special risk you do not particularly care for, and you hint a difficulty in obtaining guarantees, he will immediately inform you that you have got treaties—you can re-insure it with them. He will even go one step further and tell you you have only to keep a fifth, a seventh, or a tenth, as the case may be, for your own account, which is a mere bagatelle. He knows all your inside arrangements, and, take my word for it, he at any rate appreciates to the full the blessed advantages which a Company with treaties can afford to bestow.

But, gentlemen, there is another side to this question. One cannot help deploring the large amount of money which is paid away to foreign countries every year in the shape of re-insurances. The Tariff Offices have long been engaged in trying to improve the business, not only by obtaining better rates, but, what is much more important, by endeavouring to reduce the fire hazard in ways too numerous to mention. It would appear that foreign treaty Offices gain by far the larger benefits from these improvements. It is now no uncommon thing for huge risks to be accepted by one Office without a single surplus line being placed with a British Company. I hope the day is not far distant when some scheme may be devised whereby surplus business might be pooled amongst British Companies before having recourse to the ubiquitous foreigner.

THE SCIENCE OF MINIMISING FIRE WASTE.

By JAMES SHEPPARD.

A Paper read before the Insurance Institute of Manchester, 13th March, 1906.

THE serious extent of Fire Waste has recently received considerable attention, probably due to a feeling akin to alarm following the disastrous conflagrations at Baltimore and other cities during 1904. This aspect of the subject has been fully treated in a valuable paper by Mr. J. Allan Cook, read before the Insurance and Actuarial Society of Glasgow, in March, 1905.

A statement of methods by which such waste can be, and has been lessened, may be of interest, and it is hoped of some assistance, in promoting this important object.

Fire waste is a national loss absolute and beyond recovery, like time that has passed, but expenditure that prevents such waste is reproductive and therefore true economy. Great attention is given to the economical application of fire to industrial purposes, but, apart from fire extinction, little consideration has hitherto been effectively given to methods necessary to prevent the outbreak of fire and the spread of its destructive energy.

It is sometimes asserted that in Fire Insurance practice it is only necessary to determine a rate for risks as they exist. Whatever truth there may be in this statement it is certainly not the whole truth, for we find that proposal forms, tariff or rating schedules, rules and regulations in general use by all Fire Offices, contain provisions involving the offer of lower rates, on the removal of defects, the limitation of floor area and capacity, the isolation of elements of hazard, the provision of suitable water supply, extinguishing appliances, and fire alarms.

Fire Insurance to be a real public benefit must be, and is, conducted on these scientific principles; uniting, in some form or other, measures for the prevention of fire waste, with indemnity for such waste as may be unavoidable.

These principles were acted upon, although somewhat crudely, during the earlier years of Fire Insurance, when each Office maintained in important cities where they were largely interested, fire brigades and salvage corps of their own. In London these brigades were ultimately organised under one chief, and rendered excellent public service for 33 years, from 1833 to 1865.

The duty of extinguishing fire is now very properly left (as it always should have been) to Local Authorities, who, in view of their public character and general powers, are better able to undertake such duty, leaving the Fire Offices free to apply their experience and influence to encourage the adoption of measures proved by experience to be reliable for preventing the outbreak and spread of fire.

In this direction, during recent years considerable advance has been made amongst various classes of risks by the operation of rating schedules, and in some instances by constant inspections.

This influence of tariff rating has been most ably explained in the paper on "Tariff Legislation and Risk Improvement," read before the Insurance and Actuarial Society of Glasgow, by Mr. F. J. Kingsley, in 1899.

The system of improving and protecting risks by the application of scientific rating, with the object of minimising fire waste, is shown in the above paper and confirmed by the list of cotton mill fires and their causes, given in Appendix No. 1, to have met with marked success.

The soundness of this system being admitted and its application proved to be successful, it is in every way desirable that it should be carried out to the fullest extent possible.

To accomplish this it is increasingly necessary to adopt scientific methods.

The entire range of applied science has in one or other direction a direct bearing on fire waste, but it is manifestly impossible in a short paper to cover so wide a field. All that can be attempted is to give a brief summary of methods by which two branches of science, viz., economics and physics, may be applied to secure to some extent the end in view.

The science of economics as applied to minimising fire waste may be taken to include the collection and tabulation of experience in the various districts of the country, on all subjects relating to fires, and may be summed up in the direction "Observe and Compare."

Such science has not been applied in this country to any appreciable extent. If it had, we should now find available full information for different periods with regard to the following facts:—

1. The number and extent of fires throughout the United Kingdom, and the nature of the property affected.
2. Their cause or point of origin.
3. The amount of waste they occasion.
4. Full information regarding conditions which allowed the spread of fire through the building first involved, and to surrounding buildings where "spreads" occurred.
5. Previous fires on same premises. Persons having previous fires.
6. The number of workers thrown out of employment in consequence of fire, with the probable amount of wages lost.
7. The number of lives lost or endangered.

This information, tabulated under the various industries and occupations for each city, borough, urban, rural and parish district throughout the country, would be of the utmost public value.

In the absence of definite official information on the above subjects it is not possible to secure the application of effective remedies, or even to know whether the fire waste is increasing or diminishing.

A few of the more important cities, including Manchester, record in the annual reports on the work of their fire brigades, the value of property destroyed by fires, which their brigades attended.

Previous to 1905, the Manchester Fire Brigade reports also recorded the amount of loss on different classes of property, but for the last year, on an extended list of trades being adopted, this necessary information has unfortunately been omitted.

I suggest that your Institute should use its influence to secure a return to the former practice, so that in addition to the valuable extended list of trades and occupations, the amount of fire waste for each may also be separately recorded, and the Manchester Fire Brigade reports continue to be examples for all other brigades.

That serious evils result from the absence of all public information on these subjects was acknowledged by the Parliamentary Select Committee on Fire Brigades, who reported in 1900 that they had "been unable to get information to enable them to make an estimate or even to form an idea of the number of fires in England

and Wales, or of the value of property destroyed by fire," and they recommended "that in order to ascertain the loss of life and property occasioned by fire, Authorities should be required to send to a Government department full particulars of all fires as they occur, and that annual reports should be published containing the information so obtained."*

The mere publication of such Official Returns, giving all the information previously suggested, would alone be sufficient to effect a great reduction in the fire waste of the country, by impressing on local authorities, owners, occupiers, and employees, a sense of their duties and responsibilities, and by showing the serious results of ignorance, negligence, and carelessness.

Authoritative information with regard to the number of workers thrown out of employment, and the amount of wages consequently lost through fires, would probably induce Trade Unions to apply their influence towards minimising fire waste and call the attention of their members to the necessity in their own interest of exercising reasonable care in connection with their work.

The Factory and Workshop Act of 1901 requires occupiers to report and keep a register of every accident that may incapacitate an employee from following his or her usual employment for five hours on any one of the three working days following an accident, now proposed to be altered to disablement for one clear day.

This requirement, without causing further appreciable trouble or expense, might be extended to include reports of all fires that may occur in the factories, workshops, or other premises under inspection.

Factory inspectors now examine the means of escape provided for workers in case of fire. The receipt and tabulation of reports on fires forms an important branch of the same subject, and the publication of such reports would tend to prevent fires.

A list of fires with particulars regarding them, as previously proposed, for all factories, workshops, laundries, and other premises now under inspection, amounting to a total of 257,130 establishments, would be of great service, pending the more complete returns, recommended by the Parliamentary Committee on Fire Brigades.

* *Note.*—Since the foregoing was written the Home Office has issued a return relating to fire brigades and fires in England and Wales for the year 1903. This return gives valuable information, but the summary added is altogether misleading.

Many of the writers of papers on Fire subjects, read before Insurance Institutes, on different Manufacturing Risks, acknowledging the importance of such particulars, have given tables showing the number of fires, with their causes and the amount of losses, during a few years amongst the class of risks under consideration, but nearly all state that they have experienced great difficulty in obtaining this information and that their lists are incomplete.

One of your vice-presidents has suggested that, with the approval of the managers and the co-operation of the assessors, the Federated Institutes would be well able, so far as the provinces are concerned, to undertake the compilation of complete fire records year by year. If the Institutes would undertake this work the result could not fail to be highly appreciated, especially if the records included full information on the subjects before-named.

Very valuable tables of Cotton Mill Fires and their causes have been prepared by Mr. Thomas A. Bentley, another of your vice-presidents, who has kindly completed them up to 1903.

The fact brought out by these tables illustrates the need and value of applying economic science to the work of minimising fire waste. (See Appendix No. 1.)

While the number of fires in cotton mills was nearly 15 per cent. less during 1899–1903 than during the previous five years, the proportion of these fires of known origin in cotton mills, caused by friction of machinery, wheels and shafting, is shown to be increasing, the ratio of such fires for the five years 1899-1903, being 66·3 per cent., against 61·88 per cent., 59·52 per cent., and 61·0 per cent. for the three previous quinquennial periods. This result indicates that the form of bearings and gear, methods of lubricating or the lubricants in general use, are not equal to the stresses resulting from the increased speed at which machines and spindles are now run, and suggests that a close study should be made of the whole question to find an effective remedy. The fiery headstock will surely admit of being tamed, or at least caged.

Fires in mixing and blowing rooms, causing damages exceeding £100 each, have been brought down to a total of two during the five years ending 1903, equal to 2·1 per cent., the proportion for the previous five years being 29·36 per cent., partly owing possibly to a different system of compiling the tables, but this result is also largely due to conducting these first processes in distinct risks with

complete separation from the mill and the provision of hand-extinguishing appliances and sprinklers, as encouraged by scientific rating. The proportion of fires of unknown origin for the five years 1899-1903, is however very high.

It is desirable that all fires should be included in any tables that may be prepared, as most useful lessons are frequently taught by small fires, the origin of which can usually be definitely ascertained. All large fires have small beginnings. A summary of one of the monthly reports issued to all members of the Boston Manufacturers Mutual Fire Insurance Company, given in Appendix II., shows the value of such information. The issue of these reports to members cannot fail to encourage the adoption of precautions to guard against similar fires.

When making comparisons between the different causes of fires amongst similar classes of risks, it is desirable to take as the total the fires of known origin only, fires of unknown origin being treated separately. The term "unknown" cannot properly be included as a cause of fire.

Fires of unknown origin may usually be assumed to have resulted from similar causes, and in like proportions, to that of fires of known origin.

Fires, the causes of which are not ascertained, require careful consideration, as they comprise most large fires which usually destroy all trace of their origin. If such fires show a high percentage of the total number in a given class or district, questions of ignorance, neglect, or of wilful carelessness, constituting "moral hazard," may be involved, calling for strict investigation into all the circumstances connected with such fires.

The usual practice in the United Kingdom of granting contracts of Fire Insurance, without average or co-insurance conditions, is contrary to the science of economics, being unjust to the more prudent insurers.

The cost of, and consequent charge for, insurance is necessarily governed by the experience of Fire Offices on different classes of risks in different localities. In the absence of conditions referred to this experience is unfavourably influenced by under-insurance on the part of many insurers. This tends to prevent reduction in premiums, as persons who insure for only half the value of their property, involving the Office in a greater number of total losses, pay no more per cent. than persons who insure for full values.

This probably operates more fully in cities having efficient water supplies, fire brigades, and building regulations, relying upon which many insurers are content with under-insurance, thus preventing a general reduction in insurance rates which might otherwise be secured in districts so provided.

In the interest of the public, simple average or co-insurance conditions should be applied to all Fire Insurance contracts.

Tables of experience, of the nature before suggested, would demonstrate the extent to which loss of life and waste by fire may be due to existing economic conditions, as indicated in the foregoing remarks.

The physical conditions, chiefly responsible for fire waste as regards structures and their use, so far as at present known, appear to be :—

1. Site, plan, surroundings, exposure.
2. Construction, materials used, methods of their application.
3. Extent of open floor area, capacity, height.
4. Openings for light and other purposes through floors. Unenclosed lifts and staircases.
5. Concealed spaces between ceilings and floors, in partitions behind surface finishings, nature of such finishings, casings, trunks, spouts.
6. Enclosed and undivided roof spaces.

   With regard to roofs as usually constructed in this country it has been remarked by a great authority that a form of timber construction, forbidden on the ground level, is sanctioned for the top of buildings, where it involves far more danger.
7. Appliances for artificial lighting and warming, with their efficient maintenance and control.
8. Fireplaces, flues, furnaces, drying-rooms, stoves.
9. Methods for producing, transmitting, and applying power.
10. Running machinery of all kinds.
11. Lubrication and lubricants.
12. Storage classification and display of merchandise and general goods, wholesale and retail.
13. Nature and inflammability of all kinds of materials separately and in combination, and under process of manufacture or heating.
14. Atmospheric influences on different substances, spontaneous ignition, waste materials, cleanliness, management.

15. Water supply—volume and pressure. Extinguishing appliances—manual and automatic. Fire brigades—private and public.
16. Fire watch, fire alarms.

The tables of experience referred to under the head of Economics may add to this list.

The scientific study of these and other conditions which originate or assist the spread of fire, and the application of scientific methods for minimising the fire waste they occasion, may well occupy all the energies of the fire section of Insurance Institutes.

In connection with such studies it is necessary to have a knowledge of the action of fire and water on various materials used in the construction of buildings.

Protogrophic lantern slides, showing the results of various fire tests, were exhibited, description of which are given in Appendix III.

Results obtained by a systematic application of scientific methods for minimising fire waste based on tabulated experience with constant inspection to maintain risks up to standard as shown by the accounts of the Factory Mutual Insurance Companies of New England are very remarkable.

Nineteen Factory Mutual Insurance Companies of New England, insuring various manufacturing risks, chiefly cotton mills, are associated together for mutual service and joint inspection of risks. All require a high standard of construction and management, and most of them, in addition to full protection by efficient water supply extinguishing appliances and private fire brigades, also require the efficient maintenance of a complete sprinkler installation of the highest character.

There are other factory mutuals outside this association working substantially on similar lines.

The total amount of fire insurance with all these factory mutuals was estimated by the late Edward Atkinson, in 1904, to be £280,000,000, considered to be about 5 per cent. of the total amount of insurance against loss by fire carried on all risks in the United States. This, it is considered, will be about the constant limit as the factory mutuals do not insure risks in conflagration areas of great cities.

The Boston Manufacturers Mutual Fire Insurance Company, the principal of the above companies, show the following results in their accounts for the year 1905, and it is stated that most of the other Companies show a similar experience.

BOSTON MANUFACTURERS MUTUAL FIRE INSURANCE COMPANY
SUMMARY OF ACCOUNT FOR YEAR 1905.

		Calculating at \$5 to £1
Amount written (1124 members)		£45,000,000
Premiums (average rate 15s. 2¼d. per £100 as given in report)	£334,341	
Interest on investments	11,832	
		346,173
Losses :—		
Fire, 208 claims	£18,728	
Sprinkler damages, 81 claims ..	1,427	
		20,155
Expenses and taxes 5c per \$100 as stated in report for 1904 = 1s. per £100 insured, ...		22,800
Returned to members		289,046
		£332,001
Total receipts..	£346,173	
„ payments	332,001	
Balance for reserves	£14,172	

Approximate proportion of premiums expended on different items.

	Per cent. of premiums.
Losses including damages caused by broken or defective sprinklers	6.0
Expenses and taxes	6.8
Returns to members	86.5
Balance	0.7
	100

Average return to members for the year is stated in the report to have been 91·45 per cent. Other funds may have been applied for this purpose, and the proportion may also be influenced by term insurances.

Improvements constantly required, as suggested by past and current experiences, notably the universal introduction and efficient maintenance of sprinklers have gradually led to this result. See Appendix IV.

During the 55 years the Boston Manufacturers Company has been in operation, cash reserves amounting to £315,861 have been accumulated.

In 1878 when the premium income was only £73,200, the limit on a single risk was £16,000, what it may be now I am unable to say, probably at least £40,000.

Apparently the skilful application of science to the practice of fire insurance may be made to supersede the need for "limits" as usually relied upon.

Several of the principal proprietory fire offices operating in the United States conduct the Factory Insurance Association, which works on similar lines to that of the Factory Mutual Insurance Companies, but charging minimum premiums, relieving the insured of all further liability and uncertainty.

APPENDIX No. 1.

Summary of Fires of Known Origin and their Causes in English Cotton Mills during Five Periods of Five Years each.

Causes of Fires.	The Percentages are of the total fires of known origin.									
	1879–1883.		1884–1888.		1889–1893.		1894–1898.		1899–1903.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Friction—										
In Machinery,	90		97		144		103		63	
In Wheels,	–		–		1		–		–	
In Shafting,	1		–		5		2		–	
	91	70·10	97	61·0	150	59·52	105	61·38	63	66·3
Blowing Rooms— Hard substances in the Cotton under process, in mixing, blowing, and scutch rooms,	9	6·91	27	17·0	65	25·8	50	29·36	2	2·1
Artificial Light—										
Gas,	17	13·05	9	5·66	14	5·55	3	1·76	11	11·6
Lamps,	1	0·76	–	–	1	0·4	1	0·58	2	2·1
Electric,	–	–	–	–	–	–	1	0·58	1	1·05
Spontaneous Ignition— Amongst cotton dust and fluff,	7	5·36	5	3·14	3	1·19	-	–	6	6·3
Matches in Cotton— Treading on and striking,	–	–	8	5·05	4	1·58	–	–	3	3·2
Adjoining and defective buildings and exposure	1	0·76	4	2·52	4	1·58	10	5·84	1	1·05
Millwrights and workmen,	1	0·76	–	–	4	1·58	–	–	2	2·1
Straps and shafts breaking,	3	2·3	1	0·63	–	–	–	–	–	–
Lightning,	–	–	–	–	1	0·4	–	–	2	2·1
Gassing.	–	–	–	–	–	–	–	–	1	1·05
Outbreak of previous fire supposed to have been extinguished,	–	–	–	–	–	–	–	–	1	1·05
Skips on fire,	–	–	–	–	2	0·8	–	–	–	–
Drying in boiler house,	–	–	2	1·25	2	0·8	–	–	–	–
Stove and oil house,	–	–	2	1·25	1	0·4	–	–	–	–
Fire works back draught,	–	–	2	1·25	–	–	–	–	–	–
Suspicious incendiary,	–	–	2	1·25	1	0·4	–	–	–	–
	130	100	159	100	252	100	170	100	95	100

TOTAL of all Fires in English Cotton Mills of Known and Unknown Origin.

	1879–1883.		1884–1888.		1889-1893.		1894–1898.		1899–1903.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Total number of fires of known origin, . .	130	67·36	159	70·0	252	70·6	170	77·6	95	50·54
Number of fires the origin of which unknown or not noted . . .	63	32·64	68	30·0	105	29·4	49	22·4	93	49·46
	193	100	227	100	357		219	100	188	100

APPENDIX No. II

SUMMARY OF REPORTS ON FIRES in the Monthly Report of the Boston Manufacturers' Mutual Fire Insurance Co. for December 1905. These monthly reports apparently include all fires in which any of the associated mutual companies may be interested.

Date.	State in which Situated, and Name of Mill.	Occupation where Fire Originated.	Amount of Loss.	Description of Fire; How Discovered and Extinguished.
			COTTON MI	LLS—FIRES.
1905. October, –	Mass.: Chipopee Manfg. Co.	Coal store.	$ 239.79	Bituminous coal in bin under trestle railway track took fire. In October and also about a year previously similar trouble occurred in same locality. Extra pains had been taken to prevent heating, and vertical pipes had been driven into the coal, and temperature taken. Coal again heated trestle, and bin damaged. Coal overhauled and fire extinguished.
November 28 (5 p.m.)	Mass.: Whitman Mills.	Waste house, detached.	555.52	Men at work filling and pressing down comber waste into bags. Fire started in bag possibly from a match in the stock. Ten sprinklers on dry-pipe system opened, and one small hose stream used. One line of 2½-in. hose laid out, but not used.
December 1 (11.10 a.m.)	Mass.: Naumkeag Steam Cotton Co.	Picker room No. 2.	593.72	Fire started near opening to bin, where a man was at work removing cotton to picker. Fire probably caused by a match being stepped on. Fire flashed over pile of about 12,500 lbs. of cotton. One sprinkler opened; one small hose stream brought into play. No damage to machinery; principal damage by water to stock in bin.
December 1 (2.30 p.m.)	Conn.: Willimatic Works, Mill No. 4, Cotton Thread Mill.	Picker room, 1st storey.	Loss small; no claim.	An operator discovered fire in picker room. Cause of fire unknown. Put out by pails of water and a chemical extinguisher. 10 lbs. cotton damaged.

Appendix No. II.—*continued.*

Date.	State in which Situated, and Name of Mill.	Occupation where Fire Originated.	Amount of Loss.	Description of Fire; How Discovered and Extinguished.
			Cotton Mills—	Fires—*continued.*
			$	
December 1 (11 a.m.)	Ala.: Pell City Manfg. Co.	Suction pipe between opening and picker rooms	270.75	How caused and discovered not stated. Extinguished by two hose streams.
December 2 (9.40 a.m.)	Mass.: Tremont & Suffok Mills.	Napping room, 4th floor, No. 3 mill.	129.55	Friction of displaced belt shipper. Two sprinklers opened; these, aided by three small hose streams and pails of water, promptly extinguished the fire.
December 4 (5.15 p.m.)	Me.: Edwards Manfg. Co.	Mulehead, mule room of building No. 2.	69.34	Fire caused by hot bearing. Two hose streams, aided by an extinguisher and pails of water, extinguished the fire after about 15 minutes. Damage chiefly by water.
December 5 (4.20 p.m.)	N.H.: Jackson Co.	Spinning room, top floor, No. 2 mill.	No claim.	Hot bearing on spinning frame caused fire to start. Aside from the turning off of a few bands, no damage was done.
December 5	R.I.: Ann & Hope Mill.	Opener picker in picker room.	No claim.	Foreign substance in stock caused fire to start. Promptly extinguished by pails of water. A few pounds of cotton damaged.
December 5 (5.30 p.m.)	S.C.: Apalache Mills.	Picker room.	No claim.	Suction fan struck fire. Promptly put out by hose streams and pails of water.
December 6 (1.15 p.m.)	N.H.: Bag Mill	Picker room, main mill.	136.00	Foreign substance in stock. Fire spread from feed box of picker to cotton and waste in adjoining room. Put out by five sprinklers and hose streams.

December 7 (10.30 a.m.)	N.H.: Nashna Manfg. Co.	Spinning room, 4th storey of mill No. 3.	No claim.	The spinning frame had been stopped for a bobbin, which caused loose pulley to heat and strike fire. Fire spread across two frames, and was put out by a few pails of water. Damage slight.
December 7 (11.40 a.m.)	Conn.: Falls Co.	Opening picker.	212.08	Foreign substance in stock, struck by beater in opening picker, caused fire to break out. Eleven sprinklers opened, and, aided with one hose stream, extinguished fire.
December 7 (10 a.m.)	Mass.; Boston Manfg. Co.	Breaker picker.	100.20	Foreign substance in stock. Interior of the machine and picker trunk slightly damaged. Fire also spread to 1500 lbs. of cotton loose and in loft. Three sprinklers opened in the room and one in the picker trunk, and, aided by two small hose streams, extinguished fire. Sprinkler in trunk held fire from extending to opener in floor below.
December 7 (7.55 p.m.)	S.C.: Ap lache Mills.	Warehouse.	150.0	Cause unknown. Fire discovered in the top of a pile of cotton containing 24 bales. Three sprinklers opened and two hose streams aided in putting out the fire.
December 8 (6.10 p.m.)	Mass.: Grinnell Manfg. Corp.	Roving waste bin.	No claim.	Discovered by an electrician who was preparing to leave the mill. He partially extinguished the flames with pails of water, and called watchman. Waste removed to boiler house, where remaining fire was extinguished. Cause of fire unknown.
December 11 (5.30 p.m.)	S.C.: Apalache Mills.	Picker room.	No loss.	Suction fan struck fire. Five sprinklers opened promptly and one hose stream brought into play, which extinguished the fire.
December 11 (8.30 a.m.)	S.C.: Belton Mills.	Picker room.	442.10	Fire started in one of the breakers and spread from the machine to loose cotton on the floor into two adjoining breakers and also into two trunks. Five bales of cotton open on the floor were more or less damaged. Not stated how extinguished.
December 12 (1.45 p.m.)	S.C.: Monaghan Mills.	Opening room.	No claim.	Probably caused by foreign substance in stock. Fire drawn into picker room and extended to dust room. Promptly extinguished by four sprinklers and a small hose stream.

APPENDIX No. II.—*continued.*

Date.	State in which Situated, and Name of Mill.	Occupation where Fire Originated.	Amount of Loss.	Description of Fire; How Discovered and Extinguished.
			COTTON MILLS—	FIRES—*continued.*
			$	
December 12 (7.30 a.m.)	Mass.: Merrick Mill.	Picker room No. 2.	No claim.	Hard substance passing through machine with cotton. Fire confined to cage of picker. Extinguished by swabs and water.
December 12 (10.55 a.m.)	Mass.: Pocasset Manfg. Co.	Picker room.	900.0	Foreign substance in stock. Fire communicated to loose cotton on floor of mixing room. Extinguished by six sprinklers and five hose streams.
December 13 (7.30 a.m.)	Mass.: Pacific Mill.	Card room of yarn mill.	No claim.	A man was bringing a truck containing five picker laps from picker room through door leading into card room. Just as he pushed it inside the card room, and before he had time to shut the door, the laps burst into flame. Another man quickly closed the door, and, assisted by others, threw pails of water on the burning cotton. Truck of burning cotton taken into yard and there extinguished by pails of water. Fire probably caught from match on floor.
December 16 (7 a.m.)	Mass.: Pacific Mills.	Cloth room.	No loss.	While removing truck from the elevator to floor a match was ignited by truck wheels running over it. Flash set fire to waste or lint about the truck wheels. Man picked out burning waste and put out fire with his hands.
December 16 (1 p.m.)	Ky.: Louisville Cotton Mills.	Picker house.	1800.0	Fire started in a Kitson thread extractor. This machine located between two openers. Fire quickly communicated to large quantity of loose cotton on floor of opener room. Thirty-six sprinklers opened, which, with the assistance of two large hose streams, extinguished the fire after about 15 minutes.

December 17 (6 a.m.)	P.Q.: Merchant Cotton Mill.	Boiler house No. 1.	489.95	Cause spontaneous ignition of coal piled against wooden doors of boiler house. Four sprinklers opened and prevented the spread of fire under the ceiling; but fire had extended into concealed space between joist. With the assistance of one large hose stream, fire in hollow space was extinguished.
December 17 (6.30 a.m.)	P.Q.: Merchant Cotton Mill.	Boiler house No. 3.	30.0	While last fire was in progress in boiler house No. 1, another fire, from similar cause, started in a pile of coal in boiler house No. 3.
December 18 (1.25 p.m.)	Mass.: Falls River Cotton Mill.	Opening room of picker house in mill No. 6.	No claim will be made.	Foreign substance in stock in a waste picker. Owing to additions being made to the building and machinery, old sprinkler installation had been removed and new one not yet installed. Mill brigade and fire department brought four streams to bear and extinguished the fire.
December 18 (3.50 p.m.)	N.Y.: Skenandoa Cotton Co.	Picker room.	Not stated.	Fire discovered in a pile of cotton. Cause of fire not stated. 50 to 60 lbs. of cotton burned, 200 to 300 lbs. wet.
December 19 (forenoon)	R.I.: Lonsdale Co.	Mill No. 4.	No claim.	Fire caused by shaft becoming loose in coupling and working out, causing pulley to rub against hanger. Sparks caused by friction ignited lint and set fire to two laps in sorting room, burning about 10 lbs. of cotton. Extinguished with about 10 pails of water.
December 19 (10.15 a.m.)	N.H.: Nashua Manfg. Co.	Picker building, 2nd storey.	No claim.	Foreign substance in stock started fire in Cop breaking-up machine. Put out by four pails of water and one hose stream.
December 19 ([illegible] a.m.)	Conn.: Shetucket Co.	Picker room.	587,08	Fire started under feet of men mixing cotton in opening department. Without doubt caused by match stepped upon. About 35 bales of cotton were opened and mixed, and fire spread rapidly over same. Two sprinklers opened, and, with the assistance of the mill hose, the fire was extinguished.
December 21 (5.30 a.m.)	Vr.: North Pownall Manfg. Co.	Weave room, main mill.	No claim.	Employee accidentally knocked a lamp upon the floor, breaking it. Flame set fire to warps in four looms. Four pails of water promptly extinguished the fire.

APPENDIX No. II.—*continued.*

Date.	State in which Situated, and Name of Mill.	Occupation where Fire Originated.	Amount of Loss.	Description of Fire; How Discovered and Extinguished.
			COTTON MILLS—	FIRES—*continued.*
			$	
December 21 (8 a.m.)	Mass.: Chicopee Manfg. Co.	Picker room No. 5.	No claim.	Fire started in the second opening picker from south end and ran through trunk, opening three of the four sprinklers in the trunk, and spread to lap on intermediate picker. Sprinklers held fire in trunk, and pails of water extinguished fire in the lap About two hours afterwards fire was discovered in lap of finishing breaker in next row south of first fire, and spread to remaining laps on the aporn. These were thrown out into yard and extinguished.
December 21 (11 a.m.)	Mass.: Chicopee Manfg. Co.	Picker room.	No claim.	Fire started on a finisher aporn from no apparent cause. Put out by pails of water.
December 21 (1 p.m.)	N.H.: Stark Mills.	Picker building.	99.09	Foreign substance in stock caused fire to break out in opening room and spread over pile of waste containing 4800 lbs. Extinguished by three sprinklers and eight hose streams.
December 21 (2.30 p.m.)	Me.: Hill Manfg. Co.	Picker building No. 2.	184.80	Fire occurred in breaker carding room in third storey, and started in a pile containing 160 laps, from no apparent cause. Burning laps thrown into yard and put out by pails of water and three fire-extinguishers.
December 22 (5.50 p.m.)	N.H.: Stark Mills.	Speeder room.	56.44	Fire caused by match on floor, and spread over 1750 bobbins of fine roving. Promptly extinguished by the use of one hose stream.

December 22 (1.10 p.m.)	N.I.: Clark Thread Co.	Mixing room.	2600.0	About 40 bales Sea Island cotton had been opened and placed in piles on floor of second storey. Reflection of fire noticed on windows, and surface of piles found to be in flames. Fire probably caused by stepping on match on floor. Buckets of water failed to extinguish fire. Whistle blown, and brigade brought three hose streams into action. Meanwhile eight sprinklers opened and practically extinguished the fire. Mills amply supplied with waterproof covers. These were promptly used, preventing damage in room below. Lacings of about 20 belts cut and belts removed before they were damaged by water; other large cemented belts protected by covers and not damaged.
December 26 (4.10 p.m.)	Mass.; Chicopee Manfg. Co.	Card room, 3rd storey, No. 2 mill.	66.94	Foreign substance in stock caused fire to break out, which extended over top of slubber cans and drawing frames. Extinguished by use of hand hose and fire pails. Weave room below damaged by water.
December 26 (1.15 p.m.)	N.Y.: Saratoga Victory Manfg. Co.	Waste opening room.	No claim.	Foreign substance in stock. Sprinklers opened and promptly extinguished the fire.
December 28 (10 a.m.)	N.H.: Jackson Co.	Weave room.	No claim.	A dry cam caused fire to start. Put out by pails of water. One warp burned.
December 28	R.I.: Slater Cotton Co.	Card room No. 2.	No loss.	Fire started in head of a second intermediate speeder, caused by friction due to bushing working out of end and a wire coming in contact with head gear. Extinguished with a few pails of water.
December 28 (10 a.m.)	N.Y.: New York Mills.	Opening room.	Loss small.	Fire probably caused by match or piece of metal in comber waste, which was being used in one of the pickers. Nine sprinklers opened, and, aided by hand extinguishers and one hose stream, put out the fire in about one hour. 500 lbs. loose cotton and comber waste burned; eight picker aporns damaged.
December 29 (11.30 a.m.)	Mass.: Boston Manfg. Co.	Waste picker room.	No claim.	Caused by foreign substance in cotton. Promptly extinguished by one sprinkler and one line of small hose.

APPENDIX No. II.—*continued.*

Date.	State in which Situated, and Name of Mill.	Occupation where Fire Originated.	Amount of Loss.	Description of Fire ; How Discovered and Extinguished.
		COTTON	MILL SPRINK	LER LOSSES—NO FIRE.
			$	
November 11 (1.40 a.m.)	Mass.: Conanicut Mills.	Spinning room, 3rd storey.	184.33	Sprinkler opened from unknown cause, wetting down pair of mules, four spinning frames, four slubbers, and three drawing frames and stock.
December 29 (4.30 a.m.)	Mass.: Thorndike Co.	Spinning room.	60.88	Sprinkler opened from unknown cause, wetting down some rolls in spinning and card rooms, and about 64 looms in two weaving rooms.
December 1 (during night)	R.I.: Interlaken Mill.	Supply room.	40.68	Cause not reported. Water damaged a quantity of supplies.
December 4	Mass.: Parker Mills, No. 1.	Storehouse, No. 1.	3000.00	Neglect in keeping up pressure in dry-pipe system, allowed water to enter and freeze, bursting one head and two lengths of pipe. A change had recently been made in the superintendent and master mechanic. During the change dry-pipe apparatus neglected.
December 6 (early in morning)	N.H.: Cocheco Manfg. Co.	Storehouse.	90.33	Defective coupling in sprinkler pipe burst. Thirteen cases of goods damaged.
December 15 (9 a.m.)	Mass.: City Manfg. Co.	Card room.	375.34	Sprinkler opened from unknown cause. Clothing on four sets of cards ruined.
December 18 (8 a.m.)	Mass.: Massachusetts Cotton Mills.	Drawing room, 3rd floor.	71.57	Sprinkler opened from unknown cause, causing damage to stock.

December 18 (6.45 a.m.)	Mass.: Chace Mills.	Spinning room, 5th storey.	No claim.	Sprinkler hit by counter belt, opened, eight spinning frames, four speeder frames and 25 looms damaged by water. About 100 rubber blankets used in covering up machinery, thus preventing further damages.
		BLEACH, DYE, AND PRINT WORKS—FIRES.		
December 1 (9 a.m.)	N.H.: Cocheco Manfg. Co.	Bleach house, 1st storey.	1500.00	Fire discovered in trucks of cloth received from singeing department. Without doubt a spark remained in the cloth annd burst into flame, spreading over the cloth on about 40 trucks and up elevator to stock above. Sprinklers in bleach room out of commission on account of corroded conditions of the pipes and heads. Fire as it passed up elevator met by water from sprinklers in storey above, which prevented spread of fire in this direction. Seven streams taken from yard and street hydrants by mill and public fire brigades and extinguished after about two hours. Goods and machinery received prompt attention. The effects of this fire illustrate the need of promptly renewing all corroded pipes and sprinkler heads.
November 7 (7.20 p.m.)	Mass.: Southbridge Print Co.	Hopper over singe plate.	Loss small; no claim.	Spark from singer ignited about hopper. Put out by use of small hose. Later it was discovered that the fire had ignited lint on iron columns connecting hopper to ceiling and had passed from them through an opening and ignited lint on upper floor. This second fire put out by use of a fire-extinguisher.
December 7 (2.30 a.m.)	Mass.: Merrimach Manfg. Co.	White room of bleach house.	41.28	Fire probably caused by spark left in goods from singe room. Fire confined to a truck of goods and extinguished by pails of water.
December 9 (early morning)	Mass.: Pacific Mills, Print Works.	Singeing, shearing, and napping room.	127.90	Nothing was found to indicate cause of fire, discovered by night watchman; but overseer thinks that a spark from the singeing process may have been left in one of the rolls of cloth and smouldered until it finally burst into flame. Fire checked by watchman using pails of water, wet rags, and stamping under foot. Hose stream brought into play by six men working at night, and another watchman. Six rolls of armure cloth and curtain put up as shield against draught more or less burned.

Appendix No. II.—*continued.*

Date.	State in which Situated, and Name of Mill.	Occupation where Fire Originated.	Amount of Loss.	Description of Fire; How Discovered and Extinguished.
		Bleach, Dye, and Print Works—Fires—*continued.*		
			$	
December 28 (12.30 p.m.)	Mass.: Pacific Mills, Print Works.	Printing room.	No claim.	End of cloth in a printing machine caught fire from a gas jet used during noon hour. Extinguished by a few pails of water.
		Sprinkler Damages—No Fire.		
December 9 (6 p.m.)	R.I.: Glenlyon Dye Works.	Dye house, basement.	35.63	Sprinkler opened. Cause unknown. Water immediately shut off. A number of barrels of prussiate of potash dissolved by the water.
December 10 (7 p.m.)	Mass.: Pacific Mills, Lower Mill.	Dye house.	No loss.	Sprinkler 212° over heating coils, opened on account of increase of temperature since the closing of elevator well.
December 11 (8 p.m.)	Mass.: Pacific Mills, Lower Mill.	Dye house.	No loss.	Sprinkler 212°, in same position as previous night, opened from same cause. This head now replaced by one of 280°.
		Woollen and Worsted Mills—Fires.		
December 4 (11.45 a.m.)	N.H.: Cheshire Mills.	Picker room, woollen mills.	112.80	Foreign substance passing through picker. Extinguished by four sprinklers and a few pails of water.
December 8 (2 p.m.)	Pa.: W. Wood & Co. Woollen Mill.	Card room.	314.55	Fire probably due to hot bearing at second card cylinder. Extinguished by small hose stream.

December 28 (1.40 p.m.)	Me.: Farnsworth Co. Woollen Mill.	Card room.	Damage slight.	Fire started in back of Bramwell feed. Cause unknown. How extinguished not stated.
December 23 (6.25 a.m.)	Mass.: Newton Woollen Mills.	Gauze room.	6000.00	Spontaneous ignition. Shoddy had been sprinkled with the usual emulsion before passing through shoddy picker. Five-hose streams brought into play extinguished fire in three-quarters of an hour. Not insured in mutual companies.
		SPRINKLER DAMAGES—NO FIRE.		
December 13 (6.30 a.m.)	Me.: Cascade Woollen Mill.	Wool storage room.	3992.67	Watchman visited room at 5 a.m. and found everything all right. On going to the building at 6.30 a.m. he found water running from a sprinkler, and immediately closed the controlling valve. Failure probably due to freezing. 3000 to 4000 lbs. of wool and 1500 lbs. of cloth wet. All dye-stuffs in basement destroyed.
December 14 and 15 (6.30 a.m., 6.50 a.m.)	Mass.: Shirreff's Worsted Co.	Main mill, 1st storey.	96.50	Sprinklers gave way in consequence of being placed too near steam heating pipes. One head opened on the morning of 14th, and the head replacing this opened the following morning.
December 21 (forenoon)	Mass.: Worcester Woollen Mill Co.	Main mill, attic.	175.00	Sprinkler opened from unknown cause. Water leaked through to card room (2nd floor) and weave room (1st floor).
		HOSIERY AND KNITTING MILLS—FIRES.		
December 2 (1.45 p.m.)	Pa.: F. W. Buch Hosiery Co.	Drying box press room.	1225.91	Fire probably caused by 3-in. steam pipe in contact with woodwork of drying box. Eight sprinklers opened, preventing fire spreading. It was finally put out by the use of fire-extinguishers and a hose stream from pump.
December 6 (7 a.m.)	N.Y.: Perry Knitting Co.	In garret machine, 1st storey, No. 3 mill.	Loss small; no claim.	Fire probably caused by foreign substance getting into machine. Extinguished in ten minutes by one sprinkler and eleven extinguishers.
December 12 (1.20 p.m.)	N.Y.: Perry Knitting Co.	Speeder frame in cotton carding room.	No claim.	Fire caused by the spindle step becoming loose and rubbing on the gear on shaft. Quickly put out by the use of four extinguishers.

APPENDIX No II.—*continued.*

Date.	State in which Situated, and Name of Mill.	Occupation where Fire Originated.	Amount of Loss.	Description of Fire; How Discovered and Extinguished.
			SILK MILLS—FIRES.	
			$	
December 12 (8.15 a.m.)	N.Y.: Whitehall Water Power Co. Silk Mill.	Roof of boiler house.	Loss small.	Smoke stack passed through roof two to three inches from roof boarding; this space covered with tin, which transmitted heat to the boards, setting them on fire. One sprinkler opened, and engineer opened six others by the use of a hammer; this prevented fire spreading. Public fire department brought one hose stream into play, extinguishing the fire. Prompt measures taken to prevent further damage to stock.
December 16 (1.30 p.m.)	N.I.: Reiling, David & Schoen Silk Mill.	Garret over weave room.	1590.14	Fire caused by one of the men leaving a burning pipe in the pocket of his coat, which he hung in the garret on his return from lunch at 1 o'clock. One sprinkler opened and held fire in check. Finally extinguished by one of the men dragging a small hose up the stairs connected with stand pipe on third floor and applying the stream to the fire. Employees promptly covered up all warps by heavy blankets and paper and saved a much greater loss.
December 18 (7.10 a.m.)	N.I.: Johnson, Cowden & Co. Silk Mill.	Benzine cleaning room.	60.00 No claim.	Cleaning of silk ribbons with benzine mixed with soap. Ribbons put into the mixture in an open galvanised pail. Vapour became warm and burst into flame. Fire-extinguishers used, with the result that the burning liquid was scattered over the floor. An attempt to remove the pail containing the burning liquid still further spread the fire. Three sprinklers opened and extinguished the fire before arrival of city brigade. Mill hose laid out, but not used. It is understood that in the future this work will be carried on in an outside building properly protected.

		SPRINKLER DAMAGES—NO FIRE.		
December 22	N.Y.: Whitehall Water Power Co. Silk Mill.	Yarn drying room.	30.00 No claims.	Escaping steam from a 6-in. elbow in main steam pipe caused four sprinklers to open. Water shut off in about five minutes.
		PAPER MILLS—FIRES.		
December 15 (5 p.m.)	Mass.: American Writing Paper Co.	Bleach room, 1st storey.	Damage slight; no claim.	Cause of fire unknown. Extinguished by one sprinkler, which promptly opened.
December 19 (9.30 p.m.)	N.Y.: United Box, Board, and Paper Co. Paper Mill.	Machine and beater room, No. 2 mill.	1617.22	Spontaneous ignition of a pile of baled and bundled news stock, which extended to the roof. Eight sprinklers opened, and, with the assistance of four hose streams, the fire was extinguished.
December 8 (5 p.m.)	N.H.: International Paper Co.	Acid room of sulphite building.	No claim.	Cause unknown. Fire extinguished by the use of one hose stream.
		SPRINKLER DAMAGES—NO FIRE.		
December 30 (6 a.m.)	N.H.: Nashua Paper Coating Mill.	Gumming room.	500.00	Failure of link on sprinkler caused it to open.
		MACHINE AND METAL WORKING SHOPS—FIRES.		
November 14	N.Y.: Adriance Platt Co. Harvester Works.	Coal shed.	135.00	Spontaneous ignition of bituminous coal stored in shed on dock. Fire at bottom of pile. Four days' hard work required to remove coal and extinguish fire. Four tons of coal consumed, and shed damaged.
November 27 (4.35 p.m.)	N.Y.: Scanton Bolt and Nut Co.	Boiler house.	130.85	Heat from boiler stack caused fire to start in boiler house. Extinguished by twenty sprinklers and one hose stream.
November 27 (9 p.m.)	Pa.: Miller Lock Co.	Shed near engine house.	33.95	Charcoal dust had been recently stirred in the wooden bin in the shed. Fire supposed to have been caused by spontaneous ignition. One hose stream brought to bear by the engineer, aided by the city chemical engine, promptly extinguished the fire.

APPENDIX No. II.—*continued.*

Date.	State in which Situated, and Name of Mill.	Occupation where Fire Originated.	Amount of Loss.	Description of Fire; How Discovered and Extinguished.
	MACHINE AND METAL WORKING SHOPS—FIRES—*continued.*			
			$	
November 29 (2.30 a.m.)	Mass.: Haydenville Co. Machine Shop.	Foundry shed.	Loss small; no claim.	Two half-barrels of lime were rained on, causing fire to break out. One sprinkler opened and put out the fire.
December 13 (12.50 p.m.)	Ohio: National Cash Register Co.	Locker in tool room.	Slight; no claim.	Fire supposed to have been caused by matches in pocket of clothes hanging in locker becoming ignited by mice. Put out by pails of water.
December 13 (8.30 p.m.)	N.I.: American Locomotive Co.	Foundry.	No claim.	Fire discovered by watchman between cupolas, dry-pipe valve room and wall. The only damage was to lockers used by men for holding tools, &c. One sprinkler opened and hose from private hydrant used. Fire extinguished before public fire brigade arrived.
December 14 (1.30 p.m.)	Conn.: Ansonia Brass Copper Co.	Gear pit.	No loss.	Cause of fire unknown. Probably someone carelessly threw lighted match into the gear pit, and possibly some waste might have been in the pit and ignited by spontaneous heating. Extinguished by one line of hose.
December 16 (6.35 p.m.)	Mass.: Walworth Manfg. Co.	Bending shop.	1000.00	Fire probably caused by the spontaneous ignition of oily rags contained in eight or ten iron barrels brought into the bending shop for the purpose of having oil extracted. Men in yard brought one line of hose into play. Public department quickly arrived and soon had four streams in service from fire engines; these, drawing from main, lowered pressure so that stream from yard hydrant was useless. The fire department did good work and soon had fire extinguished.

December 18 (afternoon)	Pa.: Reed Manfg. Co.	Stock room.	98.23	Fire discovered by watchman. Cause not stated. One sprinkler opened and extinguished the fire.
December 20 (10.25 p.m.)	N.Y.: E. C. Stearns & Co.	Cupola building.	844.06	Fire without doubt caused by spark from cupola, and had probably been smouldering for some time. Extinguished by one hose stream brought into play by mill department and four by the city in about two hours. Building equipped with sprinklers, but at the time of the fire water was shut off. It is considered if the sprinklers had been in commission the fire would have been put out with very slight loss.
December 23 (7 a.m. Sunday morning)	Mass.: Wiley & Russell Manfg. Co.	Boiler room.	Slight; no claim.	Cause of fire not known. Engineer on entering room found watchman on floor dead, with his clothes burned off and the 2-inch chestnut plank floor bedded on the earth charred under him. "Many years since any loss of life has occurred at mills insured by the Boston Mutual Fire Insurance Co., the record being remarkable, and is without doubt due to the efficient work of the automatic sprinkler equipment in extinguishing fires promptly."
			SPRINKLER DAMAGES—NO FIRE.	
November 29 (4.30)	N.I.: Wheeler Condenser and Engineering Co.	Chipping shed.	No loss.	Sprinkler opened in chipping shed. Cause not reported.
			SUNDRY RISKS—FIRES.	
November 27 (4.35 p.m.)	N.Y.: General Electric Co.	Compound department.	Loss small; no claim.	Fire caused by overheating of insulating compound in tank. This caused the compound to overflow and run down cracks in the setting until it reached the hot flue below, where it took fire. Two sprinklers promptly opened, and, with the assistance of small hose, extinguished the fire. Contents of tank, with cloth and paper used in making cables, damaged.

APPENDIX No. II.—*continued.*

Date.	State in which Situated, and Name of Mill.	Occupation where Fire Originated.	Amount of Loss.	Description of Fire; How Discovered and Extinguished.
			SUNDRY RISKS—	FIRES—*continued.*
			$	
December 1 (5.15 p.m.)	N.Y.: American Hard Rubber Co.	Turning room.	15.60	Benzine used to clean photo tray in close proximity to gas flame. Benzine ignited and started the fire. Three sprinklers opened, and, aided by one hose stream, promptly extinguished the fire.
December 11 (12.25 p.m.)	Ala.: India Head Mills.	Tenement.	Slight; no claim.	Spark from chimney started fire in roof of tenement No. 8. Put out by two large hose streams.
		SP	RINKLER DA	MAGES—NO FIRE.
November 25 (6.15 p.m.)	N.Y.: A. Smith & Sons' Carpet Mill.	Cellar of print mill.	No loss.	Sprinkler opened. Cause not reported.
December 1 (8.30 a.m.)	N.Y.: Kleinert Rubber Co.	Curing room.	193.00	Two sprinklers opened in top floor. Cause not stated; probably due to overheating.
December 3 (6 a.m.)	Mass.: Ludlow Jute and Flax Mill.	Storehouse No. 23.	2000.00	Watchman discovered water flowing through doorway. A fitting in a $\frac{3}{4}$-in. test pipe at end of system had burst, allowing air to escape and water to flow through the break. The break caused by freezing. The equipment had been lately changed from wet to dry system, and water remained in fitting after the change. Electric alarm connected with dry-pipe valve had not been completed, hence was inoperative.

December 7	N.Y.: A. Smith & Sons' Carpet Mill.	Print mill.	No loss.	Sprinkler opened. Cause unknown.
December 14 (8.55 a.m.)	N.Y.: A. Smith & Sons' Carpet Mill.	Print mill, cellar.	No loss.	Sprinkler opened. Cause unknown.
December 19 (9 a.m.)	R.I.: Lonsdale Co.	Storehouse.	48.83	Sprinkler gave way. Caused by rope used in hoisting striking the head.

The foregoing statement of fires during one month indicates the nature and extent of risks insured by the Factory Mutuals of New England.

The efficiency of the employees as firemen is shown, together with the character of private extinguishing appliances provided to supplement sprinklers. The value of small hose available for instant use inside buildings is proved, as in one case a man was able to drag small hose charged with water up two flights of stairs and then effectively use it; this would be impossible with 2½-inch hose, which is the only hose usually provided in the United Kingdom.

The provision and prompt use, with most valuable results, of waterproof cloths to protect machines and stock from wet is also noticeable.

APPENDIX No. III.

SHORT DESCRIPTION OF TESTS, showing the action of fire and water under conditions recorded, on the various methods of construction, materials, and appliances named.

No. of Report by the British Fire Prevention Committee.	Structure, Material, or Appliance under Test.	Time under Test in Minutes	Maximum Temperature reached in Fahr.	Result of Test.
	WOOD FLOORS.			
18.	Solid floor of wood formed with 9-in. by 12-in. fir beams laid flat in close contact with each other, all joints grouted with liquid fireclay, covered on top with 1 in. floor boards not nailed. Area of floor 10 ft. by 10 ft. Nominal load of 20 lbs. per foot superficial. Water applied for 5 minutes and again later to extinguish fire. FIG. 1.—Underside of floor after test.	105	1955°	Soffit of wood beams charred to a depth of 2 in., beyond this no damage. To prevent fire passing through floors of this description, it is necessary that they be made air-tight, as in this test.
71.	Floor beams and posts of Jarrah timber constructed with posts 15 in. by 15 in., having cleats bolted on each side, upon which two 10-in. by 12-in. beams rested, supporting four longitudinal beams 10 in. by 10 in., 2½ in. rebated Jarrah plank floor in 8½-in. widths, spiked to the four beams. The height from floor to ceiling was 9 ft. 2 in. The floor was 22 ft. 3 in. by 10 ft. The load was 232 lbs. per superficial foot distributed. Water was applied for 5 minutes. FIG. 2.—View after test.	120	2000°	Flame passed through the planks in 84 minutes. The posts and beams were reduced in size and charred to a depth of ¾ in. A few of the bricks used for the load fell through the floor.
48.	Floor with spaced joist of fir 7 in. by 2 in., 12½ in. centre to centre, filled in with concrete and ceiled with boarding. The concrete was 5 in. thick, made with coke breeze and Portland cement in the proportion of 5 to 1. Yellow deal floor boards nailed on top of joists. The floor was 10 ft. by 10 ft., loaded equal to 100 lbs. per foot superficial.	82	2100°	In 54 minutes flame appeared through flooring on east side, concrete between two of the joists fell in 74 minutes, and the whole collapsed in 82 minutes. In a similar test, No. 16, the ceiling being formed with plaster, the floor was seriously affected in 120 minutes and suddenly collapsed a few hours later.

73.	Floor having fir supports and oak plank floor, post and beams were of yellow pine 15 in. by 15 in. and 10 in. by 12 in., oak floor 2½ in. thick rebated and spiked. The floor measured 22 ft. 3 in. by 10 ft., loaded equal to 232 lbs. per foot superficial. The height from floor to ceiling was 9 ft. 2 in. The size of floor was 22 ft. 3 in. by 10 ft. Load equal to 232 lbs. per superficial foot. FIG. 3.—View after test.	120	1750°	Posts charred to a depth of 1½ in., beams to a depth of 2 in., the 2½ in. oak plank rebated floor burned through.
	STEEL AND CONCRETE FLOORS. FLOORS FORMED WITH STEEL JOISTS AND CONCRETE.			
34.	Three rolled steel joist, 5 in. by 4½ in., weighing 19 lbs. per foot run, spaced to 2-ft. 6-in. centres, concrete 5 in. thick, made with coke breeze and Portland cement in the proportion of 5 to 1 filled in between the joists, leaving the underside of lower flanges exposed. Area of floor 10 ft. by 10 ft. Load 168 lbs. per foot superficial.* FIG. 4.—View after test.	90	1720°	After 20 minutes, at a temperature of about 1200° Fahr., the steel joists began to deflect and continued to deflect until a maximum of 10½ in. was recorded. Concrete in two side bays collapsed in 85 minutes, when the temperature was about 1650° Fahr.
61.	Steel and concrete floor similar to last, but having the metal protected. Two 7-in. by 3½-in. steel joists, weighing 16 lbs. per foot run, spaced to 3-ft. 4-in. centres, filled in with concrete 9 in. thick, made with coke breeze and Portland cement in the proportion of 5 to 1. Plastered on the underside. Thickness of concrete below the flanges of steel joist 2 in. Size of floor 10 ft. by 7 ft. 3 in. Not loaded. Boards nailed on top of concrete. FIG. 5.—View of the soffit of floor after test.	145	2230°	No deflection of joist on floor. Boards on top not affected. This floor, with slight repairs, was frequently used for other tests in same hut without sustaining serious injury. This and the previous test are conclusive as to the need of duly protecting all structural metal work in the buildings of warehouses, &c., with suitable non-conducting and incombustible material 2 in. thick.

* This is a very common form of so-called fireproof floor, but is shown by this test to be especially dangerous, explaining the distrust with which firemen regard "fireproof" buildings. It is to be feared that the Fire Offices are largely responsible for this class of floor by their acceptance of it and iron supporting columns as fireproof construction, without protection of any kind for the structural metal work.

Appendix No. III.—*continued.*

No. of Report by the British Fire Prevention Committee.	Structure, Material, or Appliance under Test.	Time under Test in Minutes	Maximum Tempera-ture reached in Fahr.	Result of Test.
23.	Columbian floor formed with steel joists, spaced to 6-ft. centres, special steel bars 2 in. deep of $\frac{1}{4}$-in. metal, spaced to 20-in. centres at right angles to the joists. Slabs for protecting the lower flanges of the joist made with crushed clinkers, sand, and Portland cement in the proportion of 4, 2, and 1, steel rods and hoop iron bands embedded in these slabs to strengthen and hold them in place during construction. Concrete for main part of floor and the sides of joist made with furnace clinkers, broken to pass a $\frac{3}{4}$-in. mesh, sand and Portland cement in the proportion of 4, 2, and 1. Thickness of concrete and air space protecting lower flange of joists 2 in. Thickness of concrete below special reinforcing bars of $\frac{1}{4}$-in. metal 1 in. Total thickness of concrete in bays 4 in. Concrete plastered $\frac{3}{4}$ in. thick. Wood fillet, 2 in. by 3 in. to 16-in. centres, placed on top of floor, filled in between with coke breeze concrete; 1-in. floor boards nailed to these fillets. Size of floor 10 ft. by 10 ft. Load 168 lbs. per square foot. Water applied for 3 minutes.	150	2335°	Concrete in bays not damaged, that enclosing beams slightly damaged and cracked. Plastering fell on the application of water. Wood floor and fillets on top uninjured. No deflection. Fire did not pass through the floor.
101.	CONCRETE FLOOR DIVIDED INTO SEVEN bays by six joists, the concrete in each bay prepared with different aggregates and ferrocrete Portland cement. The joists were 6 in. by $4\frac{1}{2}$ in. rolled steel, weighing 20 lbs. per foot run, encased with coke breeze concrete free from dust, broken to pass $1\frac{1}{4}$-in. mesh in the proportion of 5 to 1, with a minimum of 2 in. in front of the metal, rendered with plaster $\frac{1}{4}$ in. thick. The bays, 3 feet wide, of concrete between the joist were each $5\frac{1}{4}$ in. thick, all separate, resting on the walls and the concrete casing to the joist. The aggregates of the concrete in the different bays with 1 part of ferrocrete Portland cement in each case were as follows:—	180	1920°	

No. 1.—Blast furnace slag, broken to pass a $1\frac{1}{2}$-in. ring, 3 parts; clean pit sand, 2 parts.	...	...	Top cracked across in two places. Underside curved downwards $\frac{1}{4}$ in.; slight cracks visible.
No. 2.—Broken bricks, to pass $1\frac{1}{2}$-in. ring, 3 parts; clean pit sand, 2 parts.	...	...	Top cracked across in three places; slight curve downwards. Underside curved downwards $\frac{1}{4}$ in.; slight crack visible.
No. 3.—Granite, broken to pass $\frac{3}{4}$-in. ring, 3 parts; clean pit sand, 2 parts.	...	...	Top cracked across in three places; curved downwards about $\frac{1}{2}$ in. Underside curved downwards $\frac{1}{2}$ in.; about 1 in. washed off in one part and more or less all over where struck by water.
No. 4.—Burnt clay ballast, broken to pass $1\frac{1}{2}$-in. ring, mixed with its own small, 5 parts. (If fine portion had been screened out and replaced with sand this concrete would probably have resisted the action of water equally as well as the broken brick concrete.)	...	...	Top no crack or deflection. Underside not curved downwards; no cracks visible; about 3 in. washed off in parts where struck by water.
No. 5.—Coke breeze mixed with its own small, but free from dust, 5 parts.	...	...	No deflection; about 1 in. washed off soffit, generally where struck by water.
No. 6.—Furnace clinkers, broken to pass $1\frac{1}{2}$-in. ring, 3 parts; clean pit sand, 2 parts.	...	...	Top cracked across in two places; deflection $\frac{3}{8}$ in. Pitted in places about 1 in. deep where struck with water.
No. 7.—Thames ballast, screened to pass $1\frac{1}{2}$-in. ring, 3 parts; clean pit sand, 2 parts.	...	...	Top cracked in many places, generally across the slab, but also diagonally; no longitudinal cracks; curved downwards 2 in. in width. Several bad longitudinal cracks on the underside, which was damaged all over more than any of the other slabs, greatest depth 2 in.; and a hole in north-west corner through which daylight showed.

APPENDIX NO. III.—*continued.*

No. of Report by the British Fire Prevention Committee.	Structure, Material, or Appliance under Test.	Time under Test in Minutes	Maximum Temperature reached in Fahr.	Result of Test.
101.	The six beams encased with concrete similar to that used for bay No. 5, plastered as before described. Water applied for three minutes through two ½-in. nozzles at a pressure of about 60 lbs. Total size of floor 22 ft. 4 in. by 10 ft. 2 in. Load about 224 lbs. per square foot. FIG. 6.—View of beam and soffit of floor after test. FIG. 7.—Thames ballast concrete after test.	...	...	Portions of the plaster remained on the beams, but badly cracked and flaked; each beam had part of the concrete washed off where struck by water. No steel exposed. Concrete disintegrated about 1 in. in depth on the soffit of each beam in patches. No deflection of the beams.
107.	Concrete floor constructed with broad flanged steel girders and steel joist designed to carry 392 lbs. per square foot. Floor divided into three bays of 7 ft. each by two steel girders 10¼ in. by 10¼ in., weighing 61 lbs. per foot run, steel joist 4 in. by 1¾ in., weighing 5 lbs. per foot run, spaced to 2 ft. 4 in. centres between the girders, resting on bricks placed on the lower flanges of the girders. Concrete composed of 4 parts unscreened washed gravel, 2 parts washed sand, and 1¼ parts Portland cement of high grade. The concrete filled in 5 in. thick between the joists, 2 in. thick under their lower flange, and 7 in. wide over top. Girders encased with similar concrete 2¼ in. thick under lower flanges, to which metal clips were fixed to form key. Wood fillets 2½ in. by 2½ in. placed on top of concrete in sinkings between joist, to which 1-in. floor boards were nailed. Water applied for 4 minutes 20 seconds. Size of floor 22 ft. by 15 ft. Load 280 lbs. per foot superficial. FIG. 8.—View of girders and soffit of floor after test. (Gravel concrete.)	240	1705°	The gravel concrete commenced to give way with sharp reports when a temperature of 1000° had been reached, and continued to break up during the test, large portions falling when the temperature had reached 1600° Fahr. Other portions fell on the application of water. Maximum deflection 7½ in., permanent deflection 4¼ in.
108.	Concrete floor with broad flanged steel girders and steel joist in all respects similar to last, except that the concrete for the floor was composed of 3 parts furnace clinkers, broken to pass a ¾-in. ring, 2 parts sand, and 1 part Portland cement.	...	...	After the removal of the load the floor was found to be practically level and intact. There was no permanent deflection.

	The concrete encasing the steel girders was 5 parts coke breeze, broken to pass a $\frac{3}{8}$-in. ring, and 1 part Portland cement. Expanded metal was used to form a key for the concrete under the lower flanges of girders. Water applied for 5 minutes. Size of floor as last. Load 280 lbs. per foot superficial. FIG. 9.—Girders and soffit of floor after test. (Clinker concrete).			This test, compared with previous tests, again demonstrates the superiority of clinker and coke breeze aggregates over gravel aggregates for fire-resisting qualities.
109.	Concrete floor constructed with two rolled-steel joists, 10 in. by 10 in., weighing 30 lbs. per foot run, dividing the floor into three bays. One joist (A) solidly encased with concrete made with firebrick, broken to pass $\frac{1}{4}$-in. mesh, and sand in the proportion of 4 of these aggregates to 1 of Portland cement; the other joist (B) was enclosed with expanded metal fixed to a framework of $\frac{1}{4}$ in. diameter iron rods, plastered with three coats of lime and hair mortar 2 in. thick, leaving an air space between the inside of the plaster and the web of the joist. The concrete in the south bay was formed with old firebrick, broken to pass a 1-in. mesh. The concrete in the centre and north bays was formed with broken stock bricks to fall through a 1-in. mesh, with sand and ferrocrete Portland cement in each case in the proportion of 2·66, 1·33, and 1 respectively. Expanded metal was placed in the concrete of each bay 1 in. above the lower face. The soffit of concrete was plastered in two coats together about $\frac{5}{8}$ in. thick. Water was applied for 5 minutes. Size of floor 22 ft. 3 in. by 15 ft. Load 280 lbs. per foot superficial. FIG. 10.—Floor and beams after test.	240	2060°	In 50 minutes more than half of the plastering to the concrete had fallen, and in 60 minutes portions of the concrete casing to the joist (A) had fallen, but no metal exposed. In 65 minutes much of the two outer coats of plaster to joist (B) fell. In 160 minutes the concrete showed a full red heat all over; cracks appeared on the upper surface of the floor. No damage caused to the underside of concrete in either the centre or north bays. Plaster was washed from the expanded metal casing of joist (B). The deflection of joist (A) was 0·4 in. and of joist (B) 1·45 in. There was no apparent deflection in the bays.
78.	Floor constructed with lattice concrete beams, having steel rod reinforcement. Concrete composed of Portland cement and sand in the proportion of 1 to 3. The steel rods were $\frac{3}{16}$ in. and $\frac{5}{16}$ in. diameter. The thickness of concrete round rods about 1 in. Size of floor 10 ft. by 10 ft. Load 224 lbs. per foot superficial. FIG. 11.—Two views of floor after test.	107	1940°	Floor collapsed.

Appendix No. III.—*continued.*

No. of Report by the British Fire Prevention Committee.	Structure, Material, or Appliance under Test.	Time under Test in Minutes	Maximum Temperature reached in Fahr.	Result of Test.
106.	Coignet system of reinforced concrete floor divided by two beams into three bays, concrete composed of $2\frac{1}{3}$ parts furnace clinkers, broken to pass $\frac{3}{4}$-in. mesh, 1 part Thames sand and 1 part ferrocrete Portland cement. Reinforcing rods $1\frac{1}{2}$ in., $\frac{9}{16}$ in., $\frac{3}{8}$ in., and $\frac{1}{4}$ in. diameter, placed so as to give about 1 in. of concrete beyond the metal in all directions. Internal and external angles curved or rounded, soffit and top of floor plastered with mortar consisting of 1 part sand and 1 part cement. Size of floor 22·3 ft. by 15 ft. Load 280 lbs. per superficial foot. Water applied for $2\frac{1}{2}$ minutes. Fig. 12.—View of beams and soffit of floor after test. Thickness of concrete in front of main reinforcing rods shown to be insufficient to give due protection.	180	1840°	Patches of plastering fell after the first minute and continued to fall during the test. After 15 minutes the floor began to deflect, and continued to do so throughout the test. Concrete fell from beams on the application of water, exposing the rods, which were seen to be red-hot. Concrete eroded on the application of water. Permanent deflection 6 in.
112.	Floor of similar construction and size to last, but divided into four bays by three beams and continued over the walls of hut. The concrete was composed of $2\frac{1}{3}$ part blast furnace slag broken to pass $\frac{3}{16}$-in. mesh and 3 parts broken to pass a 1-in. mesh and 1 part of concrete Portland cement. The reinforcing rods $1\frac{5}{8}$ in., $1\frac{3}{8}$ in., $\frac{3}{8}$ in., $\frac{1}{4}$ in., and $\frac{3}{16}$ in. diameter. The thickness of concrete below the main rods was about $1\frac{1}{2}$ in., and below rods in bays about $1\frac{1}{4}$ in. The top of the floor was rendered with cement mortar. Load 280 lbs. Water applied for 5 minutes. The thickness of concrete protecting the reinforcing rods was again insufficent to secure the best result. Fig. 13.—View of beam and soffit of floor after test.	240	1860°	After 30 minutes the floor began to deflect, and continued to do so to the end of the test, when a maximum deflection of 4·30 in. was observed. On the application of water concrete was struck off from soffit of beams, exposing the rods, and the concrete of bays was eroded where struck by the jet. Permanent deflections averaged $1\frac{3}{4}$ in.

96	Floor formed with porous terra-cotta, hollow blocks, and three steel joists. The blocks placed between the joists, with their hollow spaces at right angles thereto, steel wire trussed band reinforcement $1\frac{1}{4}$ in. wide, placed in each longitudinal joint of the blocks 1 in. above the soffit, all grouted together with Portland cement and sand. The joists were 10 in. by 5 in., weighing 39 lbs. per foot run, and were bolted together at ends and centre with $\frac{3}{4}$-in. rods. The centre bay was fixed wide, filled in with blocks 6 in. deep; the other bays 7 ft. $1\frac{1}{2}$ in., 7 ft. 6 in., and 1 ft. $1\frac{1}{2}$ in. respectively, filled in with blocks 8 in. deep. The lower flanges of joists protected by slabs of porous terra-cotta $1\frac{1}{4}$ in. thick, the soffit plastered with "serophite" plastering in three coats, with a total thickness of 1 in. The top of floor was rendered in cement. The full size of the floor was 22·3 ft. by 10 ft., and the load 280 lbs. per foot. Water was applied for 5 minutes. FIG. 14.—Underside of floor after test.	240	1880°	Patches of plaster flaked off during the test, and on the application of water plaster was washed off where struck by the jet. Maximum deflection $\frac{3}{8}$-in., which recovered itself on the removal of load. The semi-porous terra-cotta blocks forming the floor were intact.
103.	Floor constructed with semi-porous hollow terra-cotta blocks 6 in. deep, with steel reinforcement without joists. Wrought-iron rods $\frac{1}{2}$ in. diameter, embedded in the joints, which were about $1\frac{3}{4}$ in. wide between the blocks, filled in with cement and sand mortar in the proportion of 1 to 3, the lower rods about 1 in. above the soffit of the blocks. Iron anchors $\frac{1}{2}$ in. diameter, about 2 ft. 5 in. long from blocks into wall. Cement rendering over the whole of the blocks $1\frac{3}{4}$ in. thick, soffit plastered about $\frac{1}{2}$ in. thick. Floor measured 22 ft. 3 in. by 10 ft. Load 224 lbs. per foot superficial. Water applied for 2 minutes. FIG. 15.—Underside of floor after test.	150	1840°	Plaster fell during the test. On the application of water remaining plaster was washed off where struck by the jet, and some of the joints were washed out, exposing the iron rods. Permanent deflection in centre, 3 in. cracks in several places. Floor remained in position, and the blocks were intact.
	CEILING PROTECTION.			
105.	Slabs 2 in. thick, apparently made with granulated pumice and Portland cement, were screwed to wood joist, forming a ceiling, and finished with plaster composed of fireclay, sand, and plaster of Paris. Top of joist covered with two layers of floor boards breaking joint. Floor measured 10 ft. by 10 ft. Water applied for 2 minutes.	45	1600°	No change observed during the test, except slight cracks following the direction of joints and between ceiling and wall. Setting coat fell from ceiling on the application of water, but slabs remained. Wood joists to which slabs were fixed were intact after the test.

APPENDIX NO. III.—*continued.*

No. of Report by the British Fire Prevention Committee.	Structure, Material, or Appliance under Test.	Time under Test in Minutes	Maximum Temperature reached in Fahr.	Result of Test.
	PROTECTION OF METAL COLUMNS.			
104.	Four-rolled steel joist, 6 ft. by 4½ ft., weighing 20 lbs. per foot run, placed vertically as stanchions and enclosed with porous terra-cotta known as Terrawode. The thickness of these encasements were:—No. 1, 4¾ in.; No. 2, 2½ in.; No. 3, 3 in.; and No. 4, 2½ in. No. 4 only was plastered; Nos. 1 and 2 square; Nos. 3 and 4 circular. Air space was left inside the encasement round the stanchion in each case. Load about 3 tons on each stanchion. Encasements exposed to test for a height of 8 ft. 10 in. Water applied 2 minutes. FIGS. 16 and 17.—View of protection to columns after test.	150	1950°	The encasement in each case suffered considerably. On the removal of the encasement the steel stanchions were found to be unaffected. Tests of reinforced concrete columns have not yet been made. It is very desirable to have definite knowledge of these important structures; they would probably suffer more than beams.
	FIRE-RESISTANCE OF DOORS WHEN CLOSED.			
35.	Two doors, each 6 ft. 9½ in. by 3 ft. 2½ in., framed in four panels, bead butt flush both sides, having a finished thickness of 1⅞ in. throughout, hung to 4 in. by 3 in. solid rebated frames, with 4-in. wrought-iron butts, with two 6 in. bolts on the outside of each door. One door made of pitch pine and the other of yellow deal.	57	1680°	Considerable flame appeared on the outside of both doors at the top after 25 minutes, and continuously increased during the test. Both doors practically destroyed in 57 minutes.
59.	Ledged door of yellow deal, with ledges of boarding, both 1 in. thick. Four-panel door of yellow deal, 1¾ in. thick, with panels ⅝ in. thick, both doors 6 ft. 9½ in. by 3 ft., hung to solid rebated frames, 4½ in. by 3½ in.	24	1575°	In four minutes flame appeared on the outside between frame and top of ledged door. In 15 minutes flame appeared on the outside along top of door. In 25 minutes both doors practically destroyed.

40.	Two doors, each 6 ft. $9\frac{1}{2}$ in. by 3 ft. $2\frac{1}{2}$ in., framed in four panels, bead butt flush both sides, having a finished thickness of $1\frac{7}{8}$ in. throughout, hung to 4-in. by 3-in. solid rebated frames. One door Austrian oak and the other American walnut.	60	2000°	In 15 minutes flame appeared at intervals over top rail of walnut door. In 58 minutes door collapsed. In 33 minutes flame appeared between top rail and panel of oak door. In 55 minutes door collapsed.
26.	Two doors, each 6 ft. $9\frac{1}{2}$ in. by 3 ft. $2\frac{1}{2}$ in., framed in four panels, bead butt and flush both sides, having a finished thickness of $1\frac{7}{8}$ in. throughout, hung to 4-in. by 3-in. solid rebated frames. One door made of American oak and the other door of Moulmein teak.	60	1800°	In 30 minutes flame appeared between frame and top of the oak door. In 50 minutes the door collapsed and fell outwards. In five minutes flame appeared between the frame and side of door at top. In 58 minutes door collapsed and fell inwards.
54.	Two doors, each 6 ft. 10 in. by 3 ft. $2\frac{1}{2}$ in., formed with three thicknesses of $\frac{7}{8}$-in. boards between 6 in. and 7 in. wide, the centre thickness at right angles to the outer thicknesses. The boards were butt jointed and secured together by $\frac{3}{8}$-in. double wedge-shaped pins of same material as doors driven through the thickness of door, about 240 to each door, hung to $4\frac{1}{2}$-in. by 3-in. solid rebated frames. One door and frame of oak and the other of teak. FIG. 18.—View of doors at end of test.	75	2000°	In 60 minutes flame came through bottom corner of oak door. In 67 minutes the boards on each side of centre joint bulged $1\frac{1}{2}$ in. outwards, and joints opened in 75 minutes; opening in centre widened and flames came through freely. The flames at top of door had extended across the whole width. Two of the thicknesses disappeared. The outer thickness remained in position. In 17 minutes flame appeared at top corner of teak door. In 75 minutes flames had extended across the whole of the top of door and holes along bottom. The inner thickness had disappeared; the centre thickness was charred through, but in position. The outer thickness had about four inches at top burned away.

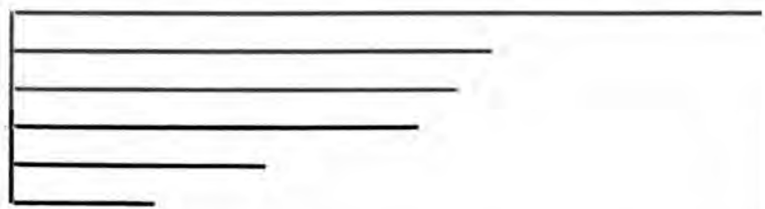
APPENDIX No. III.—*continued.*

No. of Report by the British Fire Prevention Committee.	Structure, Material, or Appliance under Test.	Time under Test in Minutes	Maximum Temperature reached in Fahr.	Result of Test.
25.	Wood door covered with tinned steel plates, and iron-framed and panelled door. The wood door lined with tin was 7 ft. 6 in. by 4 ft. 3 in. and the iron door 7 ft. 3 in. by 3 ft. 9 in. The wood door lined with tin was obtained in the open market and was 2 in. thick, made with two thicknesses of $\frac{7}{8}$-in. pine, and covered in accordance with Fire Office rules. The wrought door and frame was obtained in the open market and was made with $\frac{1}{4}$-in. plate, with stiles and rails 3 in. by $\frac{1}{4}$ in. screwed on one side only, held to the frame at hinges and lock only. FIGS. 19 and 20.—Doors after test.	60	2000°	The wood door with tinned steel plates remained in position, but was much buckled and bulged, permitting the passage of flame. The first spurt of flame over the top of door was seen after 5 minutes. The iron-framed door remained in position, but became red-hot and buckled and warped considerably together with its frame. The first spurt of flame between the door and its frame was seen after 20 minutes.
60.	Two iron doors and frames, each made with $\frac{1}{4}$-in. steel, one having stiles and rails on both sides and secured to frame at 6 points. This door was 3 ft. 8 in. wide by 7 ft. high. The door having stiles and rails on one side only was in other respects similar to above, but was secured to its frame at 5 points only. FIG. 21.—Doors after test.	60	1800°	The door with stiles and rails on both sides bulged inwards $\frac{3}{8}$ in. above and below centre fastening in 8 minutes. In 59 minutes the door was red-hot almost all over, and the bulging had increased to about 1 in. The door with stiles and rails on one side only bulged inwards $\frac{3}{4}$-in. in 5 minutes. In 11 minutes the bulge had increased to 2 in., and in 18 minutes to $2\frac{1}{2}$ in. In 59 minutes the door was red-hot almost all over, and the top corner had bent inwards $\frac{3}{4}$ in., the bolt having dropped.

67.	Two doors, one constructed with two thicknesses of white deal boards, each ⅞ in. thick, one set placed vertically and the other horizontally, with a layer of soft uralite between and layers of soft and hard uralite on the outer faces and edges; the boards secured with 2-in. wire brads, the outside uralite secured with clout nails. The frame was 5 in. by 4 in. rebated, covered with six thicknesses of hard uralite all round. The sill was similar to the frame, but not rebated. The finished size of the door was 2 ft. 7½ in. by 6 ft. 7⅜ in. and 2¼ in. thick. The other door, with its frame and sill, was similar, but covered in addition with tinned sheet-steel plates. The finished size of this door was 3 ft. 2¾ in. by 6 ft. 0¾ in., and 2½ in. thick. FIG. 22.—Doors before test. FIGS. 23 and 24.—Doors after test.	90	1780°	URALITE DOOR.—In 40 minutes a spurt of flame appeared between door and frame about 8 in. long, lasted for a short time, and then ceased. Vapour and smoke passed between door and frame throughout the test. After 90 minutes the door and frame remained in position. The door was slightly buckled. The external surface was not damaged. The uralite and steel-covered door showed similar results. The inside of the first door was much affected by the fire and water. The inner thickness of wood was carbonised throughout, and the outer thickness partly so. The plates on the inside of the second door were all in position, but much bulged towards the fire, and joints slightly open. On removing one of the plates the inner thickness of boarding was found to be carbonised. Centre uralite was not damaged. Outer boarding discoloured, but not much damaged.

APPENDIX No. IV.

CHART showing EXPENSES and LOSSES (described as the Cost of Insurance) experienced by the BOSTON MANUFACTURERS MUTUAL FIRE INSURANCE COMPANY, from 1850 to 1905, for the Periods named.

Periods.	Numbers of Years.	Average Annual Cost per £100 Insured.	Proportion of Cost to Amounts Insured.
		s. d.	
1850 to 1860, - -	10¼	8 9	
1861 to 1870, - -	10	5 7	
1871 to 1880, - -	10	5 1	
1881 to 1890, - -	10	4 6	
1891 to 1900, - -	10	2 10	
1901 to 1905, - -	5	1 6	

THE EXTRA HAZARD INVOLVED IN ELECTRIC LIGHTING AND ELECTRIC POWER TRANSMISSION.

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A Paper read before the Insurance Association of Manchester, 9th December, 1904.

In presenting this paper to the Insurance Association of Manchester I should like to recall the fact that just ten years ago, *i.e.*, in 1894, I had the privilege of reading one on almost similar lines before the Insurance Institute of Manchester.

In the period that has elapsed the science of electricity, and especially its application to every-day life, has made such wonderful progress that one is able to approach the subject from almost a fresh standpoint, although at the same time a certain amount of the original ground must of necessity be covered.

I think there can be little doubt that the fire risk, due to the introduction of electric light and power, at the present time is in some respects greater than it was ten years ago and in others less; greater from several causes, viz. :—

1st. That the use of electricity for lighting is far more general than it used to be, hence (putting aside any question of the quality of the work involved) the mere factor of the increased number of installations and lights in use *must* increase the risk.

2nd. That power transmission is coming more and more to the front, involving the employment of units and consequent energy on a scale unknown in days gone by, for one reason because the use of high voltages was not sanctioned by the Board of Trade, and also because considerable difficulty was

experienced in constructing machinery to stand such high pressure; and

3rd. That the extension of lighting and power over large areas has necessitated the habitual use of voltages which at the former date I mentioned (1894) were almost exclusively confined to the testing departments of electrical works, and certainly not for common transmission or employment.

I have given you the chief reasons why I think the fire risk is greater than it used to be, and now I will try to show why under certain conditions it may be regarded as less.

In past days it was often very difficult to get those connected with installation work to admit that an electric light installation could set fire to a building, or that a central station could burn down. I do not say the idea was absolutely scouted, but it was often received with polite incredulity. The designs of many of the older central stations and their accompanying gear were terribly defective from a fire risk point, owing to the amount of woodwork which entered into their construction, too often pitch pine, and that, too, in what were then regarded as high-tension stations, generating at 1000 or 2000 volts. Not only were switch-boards framed and panelled with it (varnished moreover) till they suggested the idea of church furniture more than anything else, but partitions were put up, the roof was carefully lined with it and often a gallery constructed over the switch-board apparently with the object of carrying the fire, should one occur, immediately to the most inaccessible spot from which it could be tackled; and other things which I need not now mention. I have no objection to wood lining in its right place, although one may easily have too much of it, but it is absolutely inadmissible in a generating station, especially if anywhere in the neighbourhood of the switch-board, which is the point where the fire risk is, so to speak, focussed.

It is now generally recognised both that electrical fires do take place and that generating stations will burn, and I am thankful to say that at the present time designers, manufacturers, and electrical engineers generally are fully alive to the necessity of keeping the amount of combustible material in their designs down to a minimum, a result with which I think the care exercised by the Insurance Companies has had something to do.

I have had the opportunity (I can scarcely say good fortune) of witnessing one or two central station accidents on a large scale, and I wish to treat specially of these later on, as an electrical fire with a huge steam plant running and developing perhaps, 5000 to 10,000 horse power to feed it, is an absolute inferno (you can use no other word) of flame, heat and noise such as no one can have any conception of who has not seen and heard it, and the only thing to say is that one's nerves feel it for some time after.

Increased Voltage as applied to Lighting and Power.

It is this question of increased voltage that I wish to treat specially as applied to lighting and power, and considered from the supply and consumers' point of view, as this is undoubtedly one of the chief risks which has to be encountered, and it must not be forgotten that what is known as insulation is only a question of degree, *i.e.*, given an electrical pressure sufficiently high any of the so-called insulators will become what is practically a conductor, while the heat of the arc once formed is so intense that almost any substance will burn in it.

At this point it will be well to briefly refer to the rules issued by the Board of Trade in connection with electrical undertakings, for although they deal more with the life risk side of the question, there is one point in which they touch the interests of the Fire Insurance Companies very closely, viz., the rule which provides that every three-wire system generating at 200 volts or upwards between the outer feeder mains and the middle or neutral wire must have the latter put to earth at as many points as possible, as, of course, under these conditions there is a difference of pressure of 400 volts or more between the two outer mains. I am not complaining of this, as I have always been a great advocate of "earthing" one main, and still think that the concentric system of wiring (over which there was so much controversy some years ago), is the safest of all from a fire point of view. All the true concentric systems, although they differed in detail, were based on putting the return wire absolutely to earth, and depending on the insulation between inner and outer conductors, the strain being thus within the cable itself and not between two contiguous wires. The fact of special fittings being required, and the difficulty of adapting those generally manufactured, to the required conditions, have proved a serious obstacle in the general employment of concentric wiring. However, this

earthing of the neutral wire, now so common, unquestionably raises a point which in the earlier days of electric lighting was practically non-existent, or, at any rate, supposed to be so. Then we had, as a rule, two-wire systems, which were presumed to be insulated on both poles, and, of course, the idea was that unless the insulation broke down on both sides not much harm could occur.

Possibly we lived in a fool's paradise, for my experience certainly was that no dependence could be placed on the insulation resistance of the negative main, it being as often as not "dead earth," and hence matters were practically in the same position as now, with this disadvantage—that you never knew whether the main was to earth throughout or only locally, or whether the earth was a permanent one or only dependent on wet weather or other causes. I think it will be obvious to everyone that certainty is better than uncertainty, hence if we know we are dealing with a negative or neutral wire, purposely earthed, and therefore have to depend entirely on the insulation of the opposite side of the circuit, it greatly simplifies the position, and renders it easier to devise safeguards to meet the case. This point of earthing also applies specially to power circuits where pressures of 500 volts or upwards are usually employed.

Curious Analogy between Water and Electricity.

Before dealing with the factor of the increased pressures now commonly used, I wish to bring before you the curious analogy which exists in many respects between a flow of water and a current of electricity. As an example, you are probably all familiar with the fact that if a water valve with a heavy head of water behind it is suddenly closed, a dull "thud" is often heard in the pipe, due to the arrested momentum of the fluid, and this involves a sudden increase in pressure momentarily, which if the pipe be not strong enough may burst it. In an exactly similar way, if a circuit carrying a heavy continuous current at even a moderate pressure is suddenly broken, the same phenomenon is repeated at the point of breaking, only in this case it takes the form of a brilliant spark, or even an arc, which in the case of a badly-designed switch or fitting may result in its being totally burned out, This effect is, I think, clearly due to the same cause, *i.e.*, arrested momentum, for since the beginning of my high tension experimental work in 1897 I have been

driven more and more to the conclusion that what is known as electricity is nothing more nor less than matter in another form, and hence has all its properties, viz., mass, momentum, &c., and that the old scientists who regarded it as a fluid were much nearer the truth than they have been thought to be in late years. The direct photographs of electrical discharges which I have been able to obtain strongly support this view, although it cannot be said that the whole chain of evidence is complete as yet.

This abnormal rise in pressure when a circuit is broken was first brought prominently forward when that pioneer of high-pressure work, Mr S. Z. de Ferranti, was endeavouring to make the Deptford Station of the London Electric Supply Company the success it deserved to be, and it is worth a great deal of attention, as it vitally concerns the question of fire risk. One of the worst dangers to which an installation can be exposed is the possibility of an arc forming across an air gap, whether between the two ends of a broken wire or in a fuse or switch with too short a break. The danger lies in the fact that the resistance of the arc, or as some maintain, a sort of counter electro-motive force set up by it, is generally sufficient to choke back the current to such an extent that, although even if the fuses in the circuit are so proportioned that they will "blow" at once in the case of a dead short circuit, an arc will not pass enough current to set them off, at any rate until the mischief is probably done and a fire started. The worst feature of this is that it is very difficult to see what form of automatic safety device could be designed to meet the case.

The sparking effect is greatly intensified should there be a magnetic circuit (such as the field coils of a dynamo) involved, as under these conditions the sudden rise of pressure, due to induction, at breaking circuit is enormous. As an example of this I may mention an experiment I was privileged to make some years ago at the generating station of the Oxford Electric Light Company in conjunction with the late Mr Rea, the chief engineer at that time. The plant there is high-tension continuous current, the large machines generating at 1000 volts, while the field coils are excited by smaller machines generating at 100, the ratio being therefore as 1 to 10. It was arranged to break the shunt circuit (or field magnet circuit) of one of the exciters through a number of 100 volt lamps in series to act as a resistance, and almost incredible as it may appear, no less than 11

or 12 (I forget which) were got up to full incandescence momentarily at the instant of "break" on the magnet circuit, corresponding to a pressure of 1100, or 1200 volts in the field coils, although the armature was only generating at 100 and the large machines at 1000 volts. The question may now arise—Why this necessity for driving up the working pressures as at the present day? and hence I should like to deal shortly with the Supply Company's view of the matter, in order to show that probably the Insurance Companies will have to deal with even heavier voltages in the future, and proportionately increased risk, if the same are extended to ordinary installation work.

In early days the electric supply stations were in many instances started by private enterprise and on a comparatively small scale, especially in the country. As the demand for current increased, new plant and extensions to the stations had to be added, and as in many cases an enormous extension of streets in the district supplied took place, it became imperative that as the existing mains became loaded to their full carrying capacity extra cables should be put down to relieve the strain and supply more consumers, if need be. This involved not only sinking a large amount of capital in the shape of extra copper, but also taking into consideration the question of how far the current had to be sent. As this was largely dependent on the working pressure available at the generating station, we now find that many of the older supply companies have changed and are changing their systems over from 100 to 200 volts on the lamp circuits, thus escaping for the present the necessity of putting new mains down, while most of the new stations are starting at 200-240 as their lighting voltage; the reason for this I will now endeavour to show.

Current, Pressure, and Resistance.

By Ohms law of resistances, which is, I think, found in every text-book on electricity, but into which I need not go exhaustively, we find that the three factors, viz., current, pressure, and resistance are mutually dependent, and one cannot be altered without disturbing the others, hence it may be roughly stated that by doubling the voltage in mains of a certain capacity the current density is reduced by half.

We therefore see that a supply company whose system is working at 100 volts, and whose mains are fully loaded at that pressure, has no alternative (if a heavy drop in pressure at the consumers' terminal is to be avoided) but to put down more

copper, or double the working voltage. Under the latter condition practically twice the number of consumers can be taken on (owing to the diminished current density in the mains) before the latter are again fully loaded. It is therefore not difficult to understand the necessity of a higher working pressure from the supply company's point, although it sometimes leads to unforeseen difficulties as regards the insulation of the mains, especially if the system be a three-wire one.

From the consumer's side of the question it cannot be said to be altogether satisfactory, as, although inducements may be held out of current at a reduced rate per unit, there is little doubt that the life (generally speaking) of incandescent lamps working at voltages of 200 and upwards is considerably shorter than those designed for a lower pressure, and hence, in many cases, much that is saved on the meter is expended in additional lamp renewals. There is also a probability in the case of a low-tension installation (100 volts) in a more or less leaky condition to earth, or between poles, that the raising of the working pressure to 200 will increase the leakage as the square rather than merely doubling it. I have mentioned before that what is known as insulation is merely a question of degree, and so far as I have been able to judge this raising of voltage, besides intensifying the old faults to which I drew attention in a previous paper, also concerns the fittings to a large extent. The principal causes of fire risk in ordinary installation work still consist of (1st) faulty joints, by which I mean those not carefully made, either partially soldered or not at all, and badly insulated; (2nd) the careless wiring of fittings whereby the insulation has been stripped or torn in drawing the wire in; (3rd) the running of wires in situations where they are accessible to damp, without any special provision for preventing electrolysis and consequent leakage to earth; and (4th) the lack of periodical inspection and testing after the plant has been put in. Too often it is handed over to whoever has to run the engine, and who, although he may be an excellent driver, and also know how to keep a dynamo armature and commutator clean, is altogether at sea if confronted by a breakdown in the house wiring, manifested by a heavy fuse "blowing." Only too frequently is the fuse strengthened until it will not go under any conditions, and then a burn out of the dynamo or a fire in the house is only a matter of time. I feel convinced that it would be most advantageous for users of private plants (especially country

ones) and for many large consumers from public supplies to have a periodical test made both between poles and to earth by someone competent to do it, as any leakage or break in continuity would be detected in its infancy and subsequent trouble would probably be saved.

Wood-Casing v. Metal Tubing. There is also one thing which has been much discussed, viz., the advantages or disadvantages of wood-casing as opposed to metal tubing for the protection of the wires. No doubt iron barrel is an ideal protection from external damage, such as nails carelessly driven in, rats (which appear to have a wonderful liking for vulcanized rubber), and other causes, but it has many defects, *i.e.*, there is almost always a ragged seam along the weld internally, which if not carefully rimered out before the wiring is drawn in will tear off the insulation like a saw, also no iron or steel pipe is free from internal sweating in a climate where great variations of temperature take place suddenly, and rust is a great enemy to insulation no matter what it may be composed of. Lastly, in an installation carried out completely in metallic conduit there is always the possibility of getting a "fault" on one portion of the building and another on the opposite pole in some remote place, when if an arc should start at both points there is the chance of a fire in two places at once. This is, of course, a remote contingency, but the possibility remains.

Increased Risk due to High Pressure. With reference to the increased risk due to high-pressure working before mentioned, in the case of a "change over" of an old installation it will generally be found that almost the whole fire risk centres round the fittings; as although many of the old designs are well adapted for the change, only too many are not, owing to the increased power of the higher voltage to "arc over" an air gap; the chief offenders in this respect are small lampholders, small switches and wall connectors, all of the old pattern, and where such are in use they should certainly be changed for those of a high-insulation pattern. To put it briefly, at every point where a circuit is liable to be suddenly interrupted, such as switches, fuses, &c., the increased fire risk comes in if the fittings are not designed to carry the working pressure to which they are subjected, for we have to realise that every time a switch comes "off" or a fuse blows a certain proportion of the metallic contacts are vapourised in the spark, and it is wonderful what a

considerable air gap may be "bridged over" in this way. For example, a pressure of 1000 volts between two metallic terminals will not spark across an air gap of $\frac{3}{4}$ inch, but let the arc be once established the metallic vapour present will enable it to be drawn out to many times this length. I have myself seen a pressure of 10,000 volts arc across a space of approximately 4 feet, due, no doubt, to the vapourised fuse wire. The design of fittings has greatly improved during the past few years, as designers and manufacturers have realised that something must be done to minimise the risk of arcing across where the terminals in fittings were too close; hence, in all well-designed appliances a "bridge" is provided in some form or another between terminals of opposite polarity, thus taking advantage of the fact that an arc can only be maintained under normal conditions in a straight line—let it be deflected ever so little it cannot be maintained.

It is singular how, sometimes, even in the best designs, points are overlooked, and as an instance I may mention a case which occurred not long ago when a double pole switch of a new type was about to be introduced. It had all the essentials of a good switch for high-tension work, viz., a quick positive action, a long break, and a good rubbing contact, but it had a metal cover, and there was scarcely $\frac{1}{16}$ inch clearance between the terminals into which the wiring came and the cover; hence, although there was little chance of trouble at the point of breaking contact, there was every probability, if the cover was carelessly removed or replaced, of obtaining a "dead short" between poles by means of it, with results which may easily be imagined.

Regarding fuse fittings and the general design of distributing fuse boards little need be said, as they are almost universally provided with the aforesaid bridge between poles, as are also lampholders; but with reference to these latter I should like to refer briefly to the switch-holder, or key socket holder as they are sometimes called. They have been immensely improved in recent years, but if they can be avoided for high-tension work so much the better. In some instances they cannot for the sake o convenience, but the chief objection to them lies in the fact that there is not room enough in the holder for the works, so that neither the length of break can be got or the terminals sufficiently separated from each other or the outer casing; also, that unless made internally of some material which will not warp, the intense heat generated by a high-tension lamp, communicated by the metal

cap to the holder, will twist the whole internal contact mechanism out of shape in a very short time, leading to faulty contacts and trouble in various forms. There are, however, several good patterns on the market at the present time.

Continuous and Alternating Currents at Same Pressure.

Before going any further, I would call your attention to the fact that a wide distinction must be made between continuous and alternating currents at the same pressure, as applied to the foregoing remarks on fittings, the spark at breaking contact being much less with an alternating than with a continuous current. This is due to the induction of the alternating current, a quality which is difficult to explain in a paper of this character, but which is easily exemplified in the ordinary "resistance coil" of a continuous-current arc lamp and the "choking coil" of an alternating one. In the case of the first we have a succession of spiral coils or helices of some wire having a high initial resistance to the passage of the current, such as German silver or platinoid, while in the second instance a coil of insulated copper wire is wound over an iron core; the result however is the same, as the induction, hysteresis, or magnetic lag (whichever name you may choose to call it) produced in the core by the alternating current chokes the latter back in the same way as the ordinary resistance in a continuous-current circuit. This factor of induction is present in all circuits where alternating currents are in use, and hence it is possible in certain instances that fittings originally designed for low-tension work may be relied on in the case of doubling the voltage if the supply be an alternating one, but it may be at once said that all cases of "change over" on a large scale require carefully going into, and it is well to have the installation overhauled and such alterations made in the fittings as are necessary to meet the altered conditions. Especially is this necessary where all three supply mains are brought into a building, as there is then the certainty (in the case of a 200-volt lamp circuit) of getting 400 volts across the outer feed mains. This is practically high-tension working, at all events it is considered so, and hence the middle or neutral wire is earthed; this throws the whole stress of keeping up the insulation of the installation on to the mains connected to the outer feeders, and a breakdown between them may lead to very serious trouble.

Earthing. This brings me to a point in connection with the "earthing" problem which is, I think, an important one, viz., the necessity of not having any device in the neutral wire where it enters the building, or at any other point that may lead to its being accidentally broken, such as a fuse or switch. I am fully aware that the point has been raised time after time by those who think that all three wires should be protected, but I must say that personally I am fully in accord with those who have raised objections to such devices being inserted. It appears to be obvious that if you have an "earthed" supply main in the roadway, the more perfectly you can connect your neutral wire in the building to that main the better it will be, as otherwise, in the event of the insulation of either feeder breaking down and the switch turned off or the fuse blown in the neutral wire, the current will inevitably go to earth by the easiest means that comes to hand, with the great probability of fire occurring.

Lighting. Before leaving the subject of lighting, it must be said that the system usually adopted at the present day is better in many ways than it was ten years ago. There is less of that abomination, the old "tree" system, with its innumerable joints (more or less doubtful) and total absence of any facilities for sectional testing in the event of a leak, and more care in the distribution of the circuits, but there can be no doubt that unless the installation is provided with fittings designed to meet the voltage they have to work at, this introduction of increased working pressures, coupled with the "earthed" neutral main in a building, is an additional fire risk with which the Insurance Companies had not to deal in the earlier days of the electric lighting industry. The old fault of work being taken on at prices when neither the best materials can be obtained or the work properly done is still prominent, and it is difficult to see how it will ever be eliminated so long as the lowest price is the surest way of obtaining a contract.

Since I last had the pleasure of reading a paper here I have seen a good deal of Continental practice, and it is very interesting to note that a system of wiring, approved in many cases, is that of a heavily insulated positive or feeder wire enclosed in a continuous metal tube, the return being made by a bare copper wire contained in the same tube and in electrical contact with it. An installation on almost this identical principle for an isolated plant came

before me some 10 or 12 years ago, and has run well ever since, but as at that time the idea of an "earthed" return (one wonders how often this was mistaken for an "earth" return) was considered, to say the least, unorthodox, the system has never found much favour.

As I mentioned earlier in this paper, the whole pith of concentric wiring is based on this principle, and it has one very important feature, viz., that all fuses and switches must be on the positive side of the circuit instead of as in former days being only too often distributed impartially between the two poles by the hap-hazard system of wiring employed.

Regarding arc lighting, the fire risk from this does not appear to be appreciably greater than formerly. In some ways it is less, as the practice of running arc lamps in series has come to the front with increased voltages, and hence the cumbersome and dangerous resistance so often installed, where an arc lamp taking 45 to 55 volts across the arc had to be run off a 100-volt circuit can be dispensed with. Also the enclosed type of lamp, *i.e.*, with a double globe, taking as it does about 80 volts across the arc, fulfils the same condition by merely requiring a resistance of comparatively few ohms for regulating purposes. Of course, the same dangers appertain to the wiring both of arc and incandescent circuits, and it must not be forgotten that where a number of arc lamps are run in series an initial pressure capable of working the number of lamps installed will have to be generated at the dynamo terminals, and that pressure will be continued up to the first lamp, after which it will, of course, drop in regular progression. The type of lamp now made leaves little to be desired as far as the enclosure of the arc by the globe is concerned.

In concluding this section of the paper I trust I may once more call attention to the necessity of having installations overhauled periodically and tested, for it is not a common thing in an ordinary lighting installation, whether town or country, for a sudden breakdown to take place (unless by an accident) capable of producing fire. As a rule a fault in a circuit will show, when a test is made, long before it becomes an absolute danger, and it is only when the deterioration is allowed to go from bad to worse that serious trouble ensues. Of course, there are exceptions, as there are to all rules, but I feel convinced that if the users of electric light, especially in the case of isolated plants in the country, would see the value of a small sum annually for "maintenance," not only

would the plant last longer, but, I venture to think, there would not be so many fires in this class of risk with "cause unknown" appended.

Power Distribution. Turning now to the question of power distribution, it is in this direction that electricity during the last few years has made the greatest progress, and the cause is not far to seek, inasmuch as there is less loss in transmitting a given amount of energy by the use of an efficient electric motor than by any other means of power transmission, the additional advantage being also present that an electric cable can be carried anywhere, hence power can be utilised in situations where driving by shaft, belt, rope, or gearing would be absolutely impossible. Added to this is the fact that by suitably combining your motors with the machines to be driven it becomes possible to cut the consumption of current down to a minimum, for only those motors need be running which are required for the work in hand; the others being switched out are, of course, using no current, hence the economy as compared with the old system of counter-shaft driving, where the engine had to be kept running no matter whether one machine or fifty were in use. I have dwelt on this phase of the subject perhaps over long, but, so far as one can see, the outlook electrically lies much more in the direction of power than light at the present time.

Regarding motors themselves, they may be divided broadly into two classes, continuous and alternating, and further sub-divided into open, semi-enclosed, and wholly-enclosed types. Up to comparatively recent times the majority of motors in this country were of continuous-current type, as although polyphase working has been in use for many years abroad it has not made much progress over here, and until quite recently it appeared to be impossible to produce a single-phase alternating motor which possessed a reasonable degree of efficiency. This difficulty has apparently been overcome, and, at the same time, several large plants generating two and three phase currents have been erected. The explanation of these systems of working belong more to electrical text-books than a paper intended for Insurance purposes, but a fairly good analogy of the mechanical effect of a single two-phase or three-phase alternating current will be found in a single cylinder steam engine with one crank, a double cylinder or compound with two cranks at 90° from each other, or a triple-expansion engine with three cranks at 120° difference.

Electrical Driving. But from a fire risk point this great introduction of electrical driving is a serious matter, for several reasons, viz., (1st) that you are often dealing with an amount of energy which completely dwarfs lighting installations (so far as the actual watts are concerned) unless the number of lamps installed is beyond the normal; (2nd) that a high voltage, for economical reasons, is almost always used for power transmission, the minimum being generally 200, while it may run up to 1000 or even more; the ordinary pressure used for tramway work is about 500, and such being the case, the question of automatic safety devices at once arises.

Of course, it may be taken for granted that all circuits supplying motors must be furnished with a main switch and fuse, but in addition to these I think in every instance an automatic safety device should be fitted, especially where the current is taken from public supply mains, for this reason, viz., that the internal resistance of a continuous-current motor armature, designed for efficiency, is so low that should the supply be cut off for any reason whatever and then switched on again, unless some resistance is inserted to check the rush of current there will practically be a "dead-short" circuit through the armature coils, and before the machine can respond to the strain upon it there is a great chance of its being burned out. Of course, some sort of starting-switch is always provided, but if this is of the ordinary non-automatic type it rests with the workman in the event of a failure of the supply current to pull the switch over and thus insert the necessary resistance. There is the chance that he may fail to do this, or he may be called away at the moment when it is wanted, and hence the necessity for some automatic arrangement which will throw in resistance and render it necessary to start the motor *de novo.* A similar arrangement has also been designed to protect motors from being overloaded, and for hoist or crane work the combined arrangement should always be provided. With polyphase alternating motors there is not the same necessity for the foregoing precautions, as the self-induction of the machine itself acts as a choking coil at starting, and thus arrives at the same end.

Encasing of Motors. Concerning the closing in or encasing of motors there is little to be said beyond what is already well known, viz., that by enclosing a motor designed for open running in a box you are lowering its efficiency some 20 or 30 per cent. and inviting the very contingency to be

avoided, viz., a burn out. There are many risks, of course (not including coal pits), where an absolutely enclosed motor is a necessity, and where this is so any one of the wholly-enclosed type of motor of modern design will probably meet the case, as these are designed with a sufficient amount of metal in the magnet cores and frames generally that the heat factor (always present in electrical or experimental work) does not assume too great dimensions.

It must not be forgotten that the phenomena of magnetism, on which all electric motors depend for their action, can be practically destroyed or, at any rate, neutralised by a sufficient degree of heat, and as an example of the evil effects of enclosing an open type motor, I may mention the case of one which came under my own notice. It was a six-horse machine, and when started cold in the morning at 6 o'clock had an efficiency of nearly 87 per cent., but before the end of the day this had dropped to 73 per cent., solely from the heating up due to want of ventilation, and the motor absolutely would not do the work required of it.

One very singular feature in connection with all electrical apparatus is its facility for collecting dust, and therefore it is very necessary where motors are installed for power purposes in such risks as wood workers, corn mills, cotton mills, and others similar, to have them totally enclosed if they are to be exposed to the dust or fly; or far better, have them placed in a room to themselves, with ample space to get round them for inspection or cleaning. With the open or semi-enclosed types this is, of course, doubly necessary.

When we come to railway or traction work we are dealing with still greater quantities—here the voltage as delivered to the actual motors is generally about 500, but that generated at the power station may be as high as 10,000 or 11,000, it being afterwards transformed down to the required working pressure. With reference to these very high voltages I hope to say somewhat in treating of central stations at the end of this paper.

Continuous and Alternating Motors.

It must not be overlooked that a broad distinction must be made between continuous and alternating current motors as regards their sparking propensities, in this respect, that the brushes on the rings of an alternating motor are merely *collectors*, and no *commutator* is used in this type of machine. As I have mentioned in previous papers contributed to the Insurance Association, all dynamos, and consequently motors,

are alternators in principle and fact, and when we speak of a continuous-current dynamo we merely mean a machine in which the windings of the armature are so arranged in conjunction with the collecting apparatus or commutator on the axle, that the alternations due to the polarity of the field magnets are delivered to the external circuit in a continuous flow—this is received by the motor and by reflex action converted into power.

The commutator of a continuous-current motor is an important factor in the fire risk, as it only too often occurs that the brushes are allowed to run out of adjustment until the excessive sparking makes the face of the commutator like a ploughed field, when this combined with the copper dust, or carbon dust, according to which kind of brush has been used, is pretty sure to cause mischief either to brushes or commutator segments. Moreover, there is the fact that unless the design of the commutator is well worked out no motor will run sparklessly unless the brushes are adjusted with reference to the nodal line or "non-sparking point" which, as is well known, moves forward in the direction in which the machine is running in proportion to the load. There are, of course, special devices by which a dynamo or motor may be made to run practically sparklessly with a fixed position of the brushes and a varying load, but a large percentage of those generally met with in Insurance work require attention on this point.

In contra-distinction to the above, the collecting rings of an alternator, whether dynamo or motor, are continuous, *i.e.*, not built up in sections; hence there is much less chance of destructive sparking, as they afford a practically smooth surface to the collecting brushes, and the potential difference occurs between the several rings—individually and not between sections in close proximity as in a continuous current commutator; but so far as my own experience has gone one of the chief points in connection with motors is cleanliness.

There must inevitably be wear and tear in the case of a machine running at perhaps 500 revolutions per minute, and whether the brushes be copper gauze or carbon, a certain amount will be rubbed off, and settle in the form of dust over the frame and various parts of the motor or dynamo. If the dust is only present in sufficient quantity (and it, of course, adheres to any oily surface) it becomes a conducting medium of little more resistance than copper itself, and may lead to a disastrous break-

down by earthing the armature to the frame of the machine, or by short circuiting the brushes, and this risk becomes greater as the pressure increases.

I think the conclusion must be arrived at that for certain classes of risk electric power is better from an Insurance point than either steam or gas, but it is useless to ignore the fact that an electric motor installed without any regard to its surroundings or the conditions under which it has to work, as one only too often finds, is a very distinct source of danger; all the more so, for as in the case of lighting, the risk is a hidden one, and cannot be detected in the same way as a defective boiler flue, or exhaust from a gas engine.

The high pressures necessary for power circuits bring into prominence the question of earthing all metallic parts of the installation that are liable to be handled, and also emphasises the necessity (before referred to) of taking all precautions that the earth shall be an efficient one. To illustrate this I will mention one instance which is very much to the point, and which came under my own notice; this was a 12 h.p. motor running at 440 volts, and working machinery on the first floor of a building, the motor itself being on the same floor. It was duly bolted down to the concrete bed on which it stood, and the earth wire was connected to the iron railing which enclosed it, but an earth test revealed a resistance in Ohms which was not surprising to anyone conversant with the insulating powers of dry concrete.

Central Stations.

The last, and to myself the most interesting problem is the fire risk due to electric lighting and power in central stations, for in these you get a concentration of energy which leads to phenomena on a scale which is almost inconceivable if a fire should occur. In former days central stations were in many instances merely enlarged editions of private plants, but now they are generally of huge dimensions, and the systems of working are very numerous. Also, instead of 2000 volts being the maximum working voltage, we have now machinery capable of generating at 3000, 5000, 7000, and 10,000 volts, while the new power station for the Metropolitan District Railway is designed for 11,000. What such a pressure means with many thousand horse power in steam behind it, I think everyone will have some idea of, but an electrical breakdown on a large scale is yet to be realised.

I am well aware that generating stations, whether for lighting or power, are not looked upon with much favour as a class of risk, although it must be admitted that there have not been as many cases of fire among them as one would have imagined considering the great number which have come into existence during the last few years, but an unfortunate feature connected with them is that when an accident *does* take place the immense power brought into play in a confined area is capable of doing a vast amount of damage in an incredibly short time. Coupled with this is the fact that electrical machinery and appliances do not take kindly to water, especially if high tension, and hence, even if the plant be shut down and a fire continue necessitating the use of water, the damage done by the soaking will very probably far exceed that actually caused by the fire itself.

Admitting, therefore, that every generating station contains within itself the means of self-destruction—as one must do if the fact that electrical energy is only steam power in another shape is once realised, with this difference, however, that the steam engines and accompanying dynamos (no matter how many) may be split up into any number of detached units, while their collective efficiency can be centred into a very small space—it will perhaps be as well to consider the chief elements of the fire risk at once.

The chief Danger-Point.

The chief danger-point is undoubtedly the switch-board and its belongings, as here the whole electrical out-put of the station (or, in other words, the horse-power being generated at the time) is, as I previously mentioned, brought to a focus; and many of the serious cases of fire damage which have occurred have had their origin at this point.

Fortunately, the designers of switch gear, especially for high pressures (and here I trust I may again mention the name of Mr. Ferranti), are fully alive to the danger, which in former days was too often overlooked, or perhaps was not fully realised.

There can be no doubt that the conditions necessary for safety on a high-tension switchboard are, 1st.—That the board, or panels which compose it, shall be of some material which is incombustible, non-hygroscopic (or which cannot absorb moisture) and does not contain metallic veins capable of lowering its value as an insulator; 2nd.—That the number of connections at the *back* of the switch-board shall be as few as possible, and also that where soldered connections are made, the thimbles into which the cables are

sweated shall not be turned *down* so that, in the event of one of them heating, the solder will not drip out followed by the bare end of the cable, which may probably fall across a terminal of opposite polarity, when a "station fire" is only too likely to be the result. The 3rd condition, and perhaps the most important of all, is that the amount of combustible matter in the cable insulation, and the number of cables themselves, shall be kept down to a minimum, and that the switchboard itself shall have ample access to the back, unless all the connections can be made on the front, as is now the case in some of the best designs. 4th.—That there shall be no mains or other means of carrying a fire upwards to the roof of the station, for on looking over some old notes I find I called attention some years ago to the fact that the insulation of a cable will burn upwards or horizontally, but not readily downwards, although the terrific heat of the arc when once formed is capable of converting any form of insulation into hydro-carbon vapour in a few seconds. If these conditions are not carried out there is all the material for rendering a central station risk a heavy one from the Insurance side.

Electrical Station Fires.

One of the factors which make electrical station fires a very interesting problem is that in many cases it is the unexpected that happens, notwithstanding all care has been taken to provide as far as possible for unforeseen contingencies.

As an example of this, I may perhaps give one or two instances which have come under my own immediate notice.

Probably one of the first fires which called the attention to the risk involved in a generating or distributing station was the one which in 1890 practically destroyed the Grosvenor Gallery Station of the London Electric Supply Company in less than half an hour, but it can scarcely be taken as a typical case, as the work of changing over to the Company's then new station at Deptford was in progress, and temporary arrangements had been made to reduce the discomfort of the consumers as far as possible. More to the point are the cases furnished by the Metropolitan Electric Supply Company, especially the accident at the generating station at Manchester Square, some few years ago, and the recent one at the Tower Street distributing station. In the first case the fire originated at the back of the main high-tension switchboard which was wired with a very close horizontal set of heavily insulated cables, the connections to the front of the slate panels being made

by screw joints. Probably one of these worked loose (the actual cause is, I believe, unknown) and started an arc which fired the cable insulation, the flames after this spreading from cable to cable till the whole of the back of the switchboard was practically a furnace, the flames from which lapped round a fireproof overhanging roof over the board (which had been provided by the Company to provide against such a possibility) and ignited the main roof of the station, after which little could be done. In the second instance, viz., that at Tower Street, the cause was far less obvious, inasmuch that every precaution suggested by previous accidents had been adopted to minimise the fire risk as far as possible.

In this case bare copper strips had been used for the heavy feeder mains rising to the switchboards, which were of the most modern pattern, by which I mean those carrying the smallest possible quantity of material which will burn under any conditions of heat.

The said copper strip mains were embedded in a bitumen trough under the station floor (which was non-combustible), and somewhere not far from the switchboard side the mischief commenced, how caused it is difficult to say, but in a few moments the insulating compound was fired and very serious damage done to the station generally by heat and smoke.

Yet another case can be cited, viz., the fire at one of the sub-distributing stations of the Oxford Electric Light Company. Here again every particle of combustible material had been got rid of as far as possible, the exception being the cable insulation and the fact that the roof of the building was supported on timber bearers.

Notwithstanding this, the whole sub-station was burned out and the machinery ruined in less than an hour by the ignition of the heavily insulated cables, the strength of the fire being no doubt increased by the electrical energy contained in the large storage battery installed in the adjoining building, which battery did not escape the general destruction.

The Point of Storage Reserve.

This point of storage reserve is a very important one in connection with fire risk, whether as regards a mansion installation or a generating station, for this reason, viz., that the whole amount of electrical energy stored, or, in other words, power accumulated by long hours of charging by the generating machinery, can be released in a moment should a serious breakdown occur, without suitable arrangements to check it are inserted, no matter whether they be fuses or other devices. The only parallel to

the electric accumulator or storage cell in its enormous capacity of rapid discharge (should there be no resistance in the circuit to check it) is the hydraulic accumulator of the late Sir William Armstrong, but even in this case the analogy is not perfect, as the friction of the water in the pipes is a factor which must be taken into consideration. Should an accumulator installation breakdown occur with a large battery, it does not appear to be possible to either estimate or measure the amount of current released in an inconceivably short space of time.

Before leaving the subject of the fire risk of generating stations, I should like to refer to one more case, viz., the switchboard fire at the Bristol Corporation Station some time ago, as on this occasion an element of risk was introduced which is, I think, almost new, viz., the oil used for maintaining the insulation of the high-tension fuses in the event of their "blowing" from any cause. In the case in point a high-tension fuse apparently "blew" from some cause or other on the 2000 volt circuit, and the arc was established before the oil could restore the insulation; the intense heat cracked the china fuse box, thus setting free the burning oil on to the switch gallery, after which other circuits and mains became involved, the ultimate result being that a large proportion of the switchboard and feeder panels were practically destroyed, and the building of the station itself badly damaged.

An additional feature in this case was that although when the fire broke ont the generating plant was at once shut down, the station was running in parallel with another, by which means the circuits were kept "alive" and the arc maintained for some time. This very clearly shows the fire danger where several generating stations are rendered inter-changeable by feeding a common set of mains. Notwithstanding, this arrangement is almost indispensable when the question of supply has to be considered, so the risk is one that has to be faced.

Presence of Material Readily Convertible into Inflammable Vapour.

In all the cases I have mentioned it has been the presence of some material readily converted into inflammable vapour by the intense heat of the arc (some thousands of degrees Fahrenheit) which, although not the primary cause, was yet responsible for the fire assuming, in a very short time, proportions with which no extinguishing appliances could deal, and a very serious side to the matter, as before mentioned, is the damage done by water, especially to high-

tension machinery. Undoubtedly, the ideal insulator is dry air, and if a sufficient air gap is provided between two bare mains of opposite polarity, no arc *can* be maintained for any great period, but it is no use to erect model stations of fire-proof construction and then load them internally with heavily insulated cables which will burn like torches if once fairly ignited. In the sub-station fire before referred to, the combustion of the bitumen in the trough is a case very much to the point, and is only one more proof of the necessity of keeping the amount of any material which will maintain a fire down to the lowest possible dimensions, no matter at what point it may be used. The fact also must not be disregarded that in the case of an arc involving metallic terminals the vapour produced by the combustion of the metal enables it to be maintained over a great distance; as an example a pressure of 10,000 volts will not in dry air break down or spark across an air gap of an inch, but let the arc be once established with a sufficient amount of horse-power behind it, it may be drawn out to an enormous distance (proportionately), as I have myself witnessed and previously mentioned.

In the case of stations using continuous current with a large battery reserve at moderate pressures, say 240 volts on the 3-wire system, there is, of course, the risk of a heavy rush of current should the battery be accidentally short circuited anywhere on the switchboard or its feeder connections, and under these conditions there is much the same risk of metallic combustion as if the system were high tension supplied direct.

I do not think it will ever be possible to entirely eliminate the fire risk in the case of central stations, owing in part to the huge scale on which operations are conducted, but anything that can be done to reduce the amount of material which will burn, and so circumscribe the area of damage, is assuredly a step in the right direction.

Concerning the new developments of electricity, such as the X Ray and Finsen work, the fire risk does not appear to be greater than with ordinary lighting if the same precautions are taken; but it must not be forgotten that a short circuit through the primary of an induction coil for Röntgen work, especially if supplied from the street mains, and not protected by some safety device, will not only break down the insulation, but almost certainly fire it, and blazing paraffin wax and vulcanite are not particularly nice things to have to handle.

Electrical Heating. The last point to which I have to refer is electric heating. Every form of heater, of course, turns upon the one principle, viz., the conversion of electrical energy into heat by interposing some resistance in its path. This is effected in several ways, viz., 1st, by passing the current through a wire of high resistance, the latter being embedded in some material having the same co-efficient of expansion, as in the early Dowsing radiators; 2nd, by the use of specially-constructed incandescent lamps, in which the conditions of filament and vacuum are so arranged that the maximum of heat is given out, as in the later form of the same radiator; and 3rd, in a new form which differs materially from the other two forms, inasmuch as, although a wire of specially high resistance is used, the latter is wound on a series of china bobbins like an ordinary resistance coil; these are enclosed in a metal box, and are intersected by a series of tubes ventilating both at the top and bottom, the air being thus caused to circulate through them in the same manner as in a hot-water apparatus. This appears to be a very safe form of heater, especially in risks where dust is present, there being no actual incandescence.

But it must not be forgotten that all electrical forms of heating are stoves in a different form, and require to be treated as such, with the additional proviso, that as all the different varieties consume a fair amount of current, it is all the more necessary to see that they are properly protected by fuses.

In conclusion, I think it must be recognised that the fire risk, due to the introduction of electric light and power, is a factor which no Insurance Company can afford to ignore, and there can be no doubt that the more the professional engineers can be met on the question of details the better, provided always that the margin of safety be not sacrificed; and, as I have mentioned in previous papers on this subject, the risks and their attendant conditions which one has to deal with in Insurance work differ so enormously that no set of rules or conditions, unless framed on the widest possible basis, or of such dimensions as to be practically useless, can be devised to meet them, for cases arise only too often in which the installation has to be designed from beginning to end with a view of meeting the special risk involved, and then it becomes a case for individual judgment.

LEGAL MATTERS RELATING TO FIRE INSURANCE.

By W. E. FARR, Solicitor, Leeds.

A Paper read before the Insurance Institute of Yorkshire, 29th January, 1906.

I DEEM it a very great honour to be asked to address the Insurance Institute of Yorkshire upon some legal matters relating to fire insurance. It is very kind of you to think that I can impart to you some legal knowledge concerning a branch of commercial business which is managed and controlled by experts who are not only familiar with the principles of fire insurance, but are practised in the art of applying those principles to modern requirements. I am sure that a representative of the great profession of the Law will receive from the representatives of the great commercial profession of Insurance, with whom we come into contact at so many points, a kindly and sympathetic hearing.

The application of legal principles affects every relationship in life, but there is no business which is more intimately associated with their practical application than the calling to which, with expert knowledge and commendable enthusiasm, you devote your working hours.

I cannot pretend in the time at my disposal to touch upon all legal matters which relate to fire insurance. I will only deal with some of the more salient and important ones, and if it is my good fortune to vest the subject with sufficient interest I may perhaps be permitted to address you again on some future occasion. May I further say that if in the course of my paper I deal with facts and principles that are familiar to most of you I would crave your indulgence in the hope that, stated with lucidity and simplicity, they may be the more easily remembered by some who are perhaps novices in the world of insurance.

The aim of insurance in all branches is to avert disaster from the insurers by transferring a contingent loss on to the shoulders of others who, for a pecuniary consideration, take the risk thereof.

The essence of an insurance policy is that it is a contract of indemnity whereby the insurer makes good within certain limits the loss sustained by the assured to his buildings and effects; it follows, therefore, that no assured can claim anything under a policy in excess of the amount he requires to make good the actual loss sustained by the happening of the events upon which the insurer's liability is to arise, and under no circumstances in theory is the assured entitled to make a profit out of his loss. If the assured could make a profit by the destruction of the thing insured there would be a continual temptation to bring about that event, and, therefore, both parties to the contract have a common interest to the preservation of the thing insured. The consequences of the principle of indemnity are, (1) that only what is actually lost need be made good; (2) if the thing insured is not totally destroyed the assured can only claim the value of the injury actually done; (3) if the assured receives the full amount of his loss any methods whereby he can repair his loss must be transferred to the insurer.

First, let me deal with Contract of Insurance. There is no statute which says that the same shall be in writing, and by the English common law, when two or more persons mutually assent to do or omit to do a thing for a good and valid consideration, there is a binding contract between the parties enforcible by the courts. There are certain statutes which, for the purpose of suppressing fraud and for the general well-being of the community, enact that contracts if not in writing shall not be enforcible by action; such, for instance, as the provision in the Statute of Frauds with reference to contracts relating to the sale of land and the sale of goods, a portion of which is now incorporated in the Sale of Goods Act, 1893, but, in the absence of any statute providing that the contract of insurance shall be in writing, the same may be by parol at common law; therefore any contract of insurance can be enforced, and there is no statutory or formal document necessary to constitute a contract of insurance. If the contract of insurance is created by any binding means, that is a policy to all intents and purposes (*in re* Norwich Equitable Fire Insurance Society, 57 L.T., 541). As a matter of practice, and for the benefit of everyone, we all know that fire insurance policies are not only in writing, but are printed, and they refer to certain printed

conditions generally endorsed on the policy, which conditions, although of vital importance, I am afraid the holders of policies do not read as carefully as they ought to do.

In my opinion every branch of the law becomes comparatively simple when you firmly grasp the principles applicable to that branch, but unless those principles are clearly perceived, confusion inevitably prevails. In order to understand any branch of the law you must always have present in your mind the principles governing the same.

The importance of the principle of indemnity as applied to the law of fire insurance cannot be over-estimated. It is the application of that principle that dissipates most of the difficulties connected with fire insurance, and those interested therein cannot keep too clearly in their minds this principle of indemnity, which that most eminent authority, Lord Justice Bowen, said "is the basis and foundation of all insurance law." Many of the principles regulating insurance law are only particular applications of this principle of indemnity, and, therefore, it is of the greatest importance in dealing with all insurance claims that the doctrine of indemnity should be kept prominently in view. Bearing in mind this fundamental principle of indemnity, let us consider when a person has an interest in property which he can insure.

It is an interesting subject to trace the decisions of the Court as to what is an insurable interest. A mere expectation or hope cannot be made the ground of an insurance policy. Lord Blackburn, in the case of Wilson *v.* Jones, L.R. 2 Exchequer, 150, said, "I know no better definition of an interest in an event than that of Lawrence (J.) that if the event happens the party will gain an advantage; if it is frustrated he will suffer a loss." Therefore, any loss which a person may sustain through the destruction of property by fire may be insured against by such person, but the assured must have an insurable interest both at the date of the policy and at the time the fire happens, and, therefore, where a lessee insured, and after the lease had expired the house was burnt down, the policy having been assigned subsequently to the fire, the assignee was held not entitled to obtain the money from the insurance office. Although risk and property generally go together, they are not necessarily associated, and the risk alone will suffice to sustain the insurance.

A very interesting question in connection with insurable interest arises as to the rights of a person who only has a limited

interest in property which is destroyed by fire. If in any such case of limited ownership the limited owner recovers the full value of the property he is not entitled to retain the full value for his own use, in consequence of the contract of insurance being one of indemnity. Lord Justice Bowen said, in the case of Castellain *v.* Preston, 11 Q.B.D., 380, "It is an illusion to suppose that the assured can in any case recover more than his loss. We must look at the ordinary business rules. It is well known that a person with a limited interest may insure and recover the whole value of the thing insured, but then his policy must be apt for the purpose and he must have intended to so insure." In the case, therefore, of a person having a limited interest in the subject matter of an insurance who insures for the full value thereof, if he only intends to insure his own interest, he can only in the event of a loss recover the bare loss he has sustained in respect of his interest in the subject matter of the insurance, no matter what may be the amount for which he is insured. If, on the other hand, his intention was to insure for the whole value, in the event of a loss he can recover the full amount of the loss, but after satisfying his own claim he holds the surplus for the benefit of those whose interest he intended the assurance to cover; if, however, having intended only to cover himself, and being a person whose interest is only limited, he cannot hold anything beyond the amount of the loss caused to his own particular interest. So in the case of a mortgagee who has lent £1000 on buildings worth £5000, if he insures for £5000, meaning only to cover his own interest and not the interests of the mortgagor, he cannot recover and hold £5000. To do so would be an over-insurance, and it would make the policy not a contract of indemnity but a wager speculation for gain. So supposing there are three mortgagees of the same property for £1000 each, they cannot all recover the entire value of the property; even if they insure for the full value of the property they can only recover what they have lost, that result resting upon the doctrine of indemnity. The leading case (which cannot be too carefully perused) upon insurance being a contract of indemnity is the case of Castellain *v.* Preston. That was a case in which a vendor agreed to sell a house for £3100 which had been insured by him with the London, Liverpool and and Globe Insurance Company against fire. The contract of sale contained no reference to the insurance. After the date of the contract, but before the date fixed for completion, the house was

damaged by fire, and the vendor received £330 from the insurance company in respect of his claim, the insurance company being ignorant of the existence of a contract for sale. Some months after the purchase was completed and the whole of the purchase money was paid to the vendor without any abatement on account of the damage by fire, which resulted in the vendor profiting by the fire to the extent of £330, the amount he had received from the insurance company. Thereupon the plaintiff brought an action on behalf of the London, Liverpool and Globe Insurance Company against the vendor to recover a sum equal to the insurance money received by the vendor. The case first of all came before Mr. Justice Chitty. He came to the conclusion the insurance company could not recover against the defendant because he (the vendor) had no right he could enforce against the purchaser to which the insurance company could succeed on making good the indemnity, the completion of the purchase having taken place, and consequently the insurance company could have no greater right than the vendor. The case was then taken to the Court of Appeal, where the judgment of Mr. Justice Chitty was reversed, and it was held that the insurance company were entitled to recover from the vendor a sum equal to the insurance money the vendor had received. Brett (L.J.) in his judgment in this case on page 386, said, "The very foundation in my opinion of every rule which has been applied to insurance law is this, namely, that the contract of insurance contained in a marine or fire policy is a contract of indemnity, and of indemnity only, and that this contract means that the assured, in case of a loss against which the policy has been made, shall be fully indemnified, but shall never be more than fully indemnified. That is the fundamental principle of insurance, and if ever a proposition is brought forward which is at variance with it, that is to say, which either will prevent the assured from obtaining a full indemnity, or which will give to the assured more than the full indemnity, that proposition must certainly be wrong." This very clear statement shows clearly that the foundation of the great fabric of insurance law is the principle of indemnity, and from the principle of indemnity naturally follows the doctrine of subrogation. Subrogation is the right one person has of standing in the place of another and availing himself of all the rights and remedies of the other. It exists where a person having two distinct remedies against different

parties for one and the same claim recovers from the person who is only secondarily liable for such claim, whereupon the person paying the claim is entitled to recover from the party primarily liable. It may be that the party paying the claim may have to use the assured's name in order to enable him to recover the amount he has paid. That is a question of detail and practice with which we are not concerned. If it is necessary, in order to comply with a technical requirement, the party who has paid the claim is entitled to use the assured's name for the purpose of recovering from the party primarily liable. So if my premises are damaged by fire during a riot, and I recover from the insurance company the damages sustained, the insurance company have the right to recover from the hundred, who is responsible to me for any damage done by the rioting, the amount I have been so paid by the insurance company. Justice Chitty, in his judgment in Castellain *v.* Preston, however, limited the doctrine of subrogation by placing the insurer in the position of the assured, only for the purpose of enforcing a right of action to which the assured might be entitled, thus holding that if the right of action was at an end the right of substitution was at an end, the right of action having been determined by the satisfaction of the assured's claim by the person against whom he had such right. The Court of Appeal, however, swept away this limitation and put the doctrine of subrogation in its largest possible form, holding that by the doctrine of subrogation the person secondarily liable, that is to say, the insurance company, was "entitled to the advantage of every right of the assured, whether such right consists in contract fulfilled or unfulfilled, or any remedy for tort capable of being insisted on or already insisted on, or any other right, whether it was a condition or otherwise, legal or equitable, which can be or has been exercised or has accrued, and whether such right could or could not be enforced by the insurer in the name of the assured by the exercise or acquiring of which right or condition the loss against which the assured is insured, can be or has been diminished."

It seems to me impossible to make the right of subrogation more comprehensive. In the case under consideration the right of the vendor to the whole of his purchase money had not only accrued, but such right had been satisfied; nevertheless, it was held that the vendor's insurers were entitled to recover from their assured an amount equal to the sum they had paid to him. Now,

let me direct your attention to the very recent case of the Phœnix Insurance Company *v.* Spooner, reported in the King's Bench Division Law Reports for December last, which further illustrates the doctrine of subrogation. In that case the defendant received a notice to treat from the Plymouth Corporation for certain buildings under the Lands Clauses Consolidation Act, 1845. Before anything could be done under that notice the buildings were destroyed by fire, and the insurance company paid to the owner £925, the agreed amount of her loss. After the fire the amount to be paid by the Corporation on taking over the property pursuant to their notice to treat, was agreed between the defendant and the Corporation at a sum arrived at by taking into account the money received by the defendant under the policy, the Corporation agreeing to indemnify the defendant against any claim which might be made against her by the plaintiffs. The defendant endeavoured to evade the wide definition of the doctrine of subrogation by contending that the statutory notice to treat differed from contractual rights, and that, by virtue of the notice to treat, the persons giving it, that is to say, the Corporation, were subrogated to all the rights, in respect of existing contracts, of the person to whom it was given, and one of such rights was the right to benefit under the policy of insurance. If this contention had been upheld the policy of insurance would have automatically operated for the benefit of the Corporation from the time of service of the notice to treat. It is difficult to see on what grounds the insurance company should be prejudiced because the Corporation had given a notice to treat which would ultimately result in the property being transferred to the Corporation after the price had been agreed, when they would not be affected by a mere contract for sale between the assured and the purchaser. Once again the principle of indemnity applied by Mr. Justice Bigham to the facts clearly showed the right of the parties. He held that the insurance policy was a contract of indemnity, and on payment of the loss sustained by the defendant the insurance company became entitled to all the rights then vested in her in respect of the destroyed property, which rights included the right to be paid by the Corporation the value of the destroyed property as at the date of the notice to treat, which was the value before the fire, and that the defendant could not deprive the plaintiffs of the benefit of the right by any agreement she made with the Corporation. The risk was the risk of the Corporation from the time of the notice to treat.

In view of the comprehensive definition of the doctrine of subrogation it seems almost impossible to conceive any case in which a person secondarily liable cannot recover from the person primarily liable, but what seems impossible to the lay mind does not always present insuperable obstacles to the lawyer. So in the case of Burand *v.* Rodocanachi, 7 Appeal Cases, 333, the United States Government paid a sum of money to the owners of a ship who had also recovered from the insurers in respect of the loss. The insurers were unsuccessful in recovering from the owners a sum equal to the amount received from the United States Government on the ground that the assured had no right to the amount paid to them by the United States Government, which payment could only be deemed a gift intended to benefit the assured above and beyond the amount they might get in consequence of the insurance, the payment not having been made in reduction of the loss. Therefore, although the right of subrogation includes every right of the assured, it does not include benefits which come to him voluntarily which he is not, and never has been, in a position to enforce as legal or equitable rights. Gifts, however, under these circumstances are things of rare occurrence, and in the common operations of life one is not likely to have to deal with benefits coming to an assured which cannot be regarded as rights.

Do not forget that the case I have before mentioned of the Phœnix Insurance Company and Spooner decides that no arrangement between a purchaser and the assured can operate to defeat the rights of the insurer accruing through the application of the doctrine of subrogation. Applying this principle in practice where the landlord insures, having a covenant by the tenant to repair upon damage accruing by fire, and the insurance office pays the landlord, the insurance office succeeds to the right of the landlord against the tenant. If, on the other hand, the tenant repairs, the insurer has the right to receive from the assured a sum equivalent to the benefit which the assured has received from such repairs. So if the assured has any contract or right relating to the subject matter of the assurance, upon receipt by the assured of the damages sustained to the subject matter of the insurance, the insurer is entitled to the benefit of such contract or rights.

May I refer to the well-known case of the King and Queen Granaries, in which case a large amount of corn was stored by a

merchant with a warehouseman. By an implied custom of the grain trade in London the warehouseman is responsible to the merchant for any loss by fire on grain stored with him. Both the merchant and the warehouseman effected separate and distinct policies of insurance upon the grain. A fire occurred, and the question arose which insurers were to bear the loss. It was held that, the warehouseman being primarily liable, the loss fell upon his insurers, and any monies received by the merchant from his insurers could be recovered by the latter from the person primarily liable and his insurers. There is a further element of interest in this case in that both the insurance policies were subject to the usual condition, that if at the time of any loss happening to the property there were other subsisting insurances (whether effected by the assured or any other persons) covering the same property the company were not liable to pay more than their rateable proportion of loss, and it was contended on behalf of the insurers of the warehouseman that this clause established a right of contribution between the two insurance companies. This leads me to deal with the right of contribution which exists where the same person insures the same subject matter in two offices. The warehouseman's insurance company argued that, in consequence of the insertion of the condition in both policies, they were only liable for a moiety of the damage. But the warehouseman, who was the person upon whom the whole loss fell, was not prevented by the insertion of the clause from recovering more than the moiety of the loss, and it could not have been the intention of the insurance company in inserting the clause to prevent him recovering his whole loss. Lord Justice Mellish, in his judgment, pointed out that the clause, so far as regards the merchant's insurers, would imply that they were liable to pay their assured the other proportion, on the assumption that they would be liable to pay the same, but the risk being wholly with the warehouseman, neither the merchant or his insurers were liable to pay any part of the loss; therefore, as each assured could recover the full value of the property from his insurer, it follows that one insurer must have his assured's remedy against the other, and the warehouseman's insurers would, in the last resort, be liable for the whole amount of the loss.

It may be well to consider whether there is any difference between the position of an insurer and a surety, as some confusion has been caused by supposing that they both occupy the

same position. Lord Justice Bowen, however, in the case of Castellain *v.* Preston, points out "a surety is a person who answers for the default of another, and an insurer is a person who guarantees against loss by an event. The default or non-default of another as between that other and the person who is insured may diminish or increase the loss, but what the insurer is guaranteeing is not the default of that person, but guaranteeing that no loss shall happen by the event, and the doctrine of subrogation as applied to fire insurance is the particular application of the principle of indemnity to a special subject matter." Subrogation is not the whole law of indemnity, but only a part of it, and, therefore, it is not a question of the insurer standing in the place of and being entitled to only the rights of the assured arising out of the loss, as would be the case if the right of the insurer was analagous in all respects to that of a surety, but the right operates wherever the enforcement of it tends to improve the position of the insurer or to diminish his loss. Before I leave this right of abrogation which I have dealt with at such considerable length, may I refer to the case in which a fire is caused by the negligence of the assured or his servants. This does not, of course, affect the liability of the insurance company, but where a fire has spread and property belonging to others has been destroyed, the effect of the negligence becomes important.

There is no better definition of negligence than the one given in the case of Beaven *v.* Pender, 116 B.D. 503, in which Brett (M.R.) said, "Wherever one person is by circumstances placed in such a position with regard to another, that everyone of ordinary sense who did think would at once recognise that if he did not use ordinary care and skill in his own conduct with regard to those circumstances he would cause danger of injury to the person or property of the other, a duty arises to use ordinary care and skill to avoid such danger of injury."

Consequently legal negligence arises from the absence of such ordinary care and skill whereby injury arises, and a legal liability is created enforcible by action.

Further, the neglect to use ordinary care and skill by a servant acting in the course of his ordinary employment creates the same liability upon the master as if the default was committed by the master himself.

Bearing in mind the definition of negligence, if injury is caused to the property of another by the negligence of a servant,

the person injured has a right of action against the negligent servant's employer, and if the injury results in the destruction of property by fire, applying the doctrine of subrogation, it necessarily follows that insurers of the person who suffers loss have the same rights against the employer of the negligent servant as their assured. In order to enable the insurers of the property destroyed as the result of the negligence of another person's servant to recover against the employer of that servant, the negligence of the servant must be committed in the course of the employment. As far as I know there is no decided case upon the point, but, after all, cases are only application of principles to the varying circumstances of each particular case, and therefore, anticipating such circumstances, the result, in my opinion, would be disadvantageous to the master of the negligent servant.

Referring once more to the doctrine of subrogation, which is (always remember) based upon the fundamental principle of indemnity, what are the rights of different persons who insure the same property in respect of their different rights, as, for instance, the case of a tenant for life and remainder man, each insuring in different offices their respective interests? If each recover the value thereof, which added together make up the value of the whole, no case either of subrogation or contribution arises, because the loss is divided between the two companies in proportion to the interests in the subject matter of the insurance. So in the case of a mortgagor and mortgagee both insuring their respective interests: if the mortgagee received the full value of the subject matter of the insurance he cannot hold anything beyond the amount of the loss caused to his particular interest.

Lord Justice Bowen, in Castellian *v.* Preston, suggested the interesting case of a tenant for life, being a very old man, whose house was burnt down, having effected an insurance only intended to cover his own interest, doubted whether in such a case, if the tenant for life (having intended to insure only his life interest) died within a week after the loss by fire, the Court would award his executors the whole value of the house. "In all these difficult problems," he said, "I go back with confidence to the broad principle of indemnity. Apply that and an answer to the difficulty will always be found."

In the case suggested by Lord Justice Bowen, if the tenant for life insured for the full value of the subject matter, I think the executors would hold the balance, over and above the interest of

the tenant for life, on behalf of the remainder man, as otherwise the representatives of the tenant for life would be more than indemnified, which is a result just as inconsistent with the principle of indemnity as that which prevents the assured from obtaining a full indemnity. The one inflicts an injury upon the insurer, the other upon the assured, and the policy of the law is to do equal justice to both.

Let me for a moment deal with the liability of a bailee for loss by fire. A bailment is a delivery of goods by the owner to another person for a certain purpose, and the liability of the bailee (the person receiving the goods) depends upon whether the bailee benefits from the transaction. I must not, however, wander into the law of bailments, a subject of interest and importance though it be to the trading community. I will only deal with the liability of bailees from an insurance point of view. In the absence of agreement or usage of trade at common law, only two kinds of bailees (common carriers and innkeepers) are responsible for loss of the goods deposited with them. In all other cases of bailment there is no liability on the bailee. If, therefore, the bailee insures the goods, the subject of the bailment for their full value having an insurable interest therein for the amount of his charges, he can recover the full amount of the loss from the insurer, but after satisfying his own claims he holds the balance as trustee for the real owners. Take the case of a bailee receiving goods to work upon (as, for example, a dyer receiving goods for the purpose of dyeing) and both owner and bailee insure for the full value. The dyer, in the absence of a usage in the trade, not being liable for loss arising from fire, the case is identical with the principle expounded in the King and Queen Granaries case, and the entire liability is upon the owner's insurers. If only the dyer insures he can recover the full value of the goods, and he holds the balance after payment of his charges in trust for the owner. If the dyer's policy is stated to be "upon his goods and those held by him in trust or on commission" he can recover the full value of the goods sent to him, and after payment of his charges he holds the balance in trust for the owner. Water *v.* Monarch, 25 L.J.Q.B. 102.

Assuming the condition of the policy restricts the insurance to "goods the assured's own in trust or on commission for which he is responsible," the Court held, in the case of the North British and Mercantile Company *v.* Moffat, 41, L.J.N.S.C.P. 1, that the

insurance company had limited their liability and the bailee could not recover the full value thereof.

You will remember that in the King and Queen Granaries case the Court applied the doctrine of subrogation, but the doctrine of contribution is of all importance to insurance companies and must not be overlooked. It is but another application of the principles of indemnity. It only applies when two or more policies have been taken out upon the same subject matter and the total amount thereof exceeds the total value of the subject matter insured. So if one insurer pays the full amount of the loss he is entitled to contribution from the other insurers. Porter, in his book on Insurance, p. 270, clearly distinguished between subrogation and contribution, both founded on the bed-rock principle of indemnity, when he says, "The aim of contribution is to distribute the loss among the different persons liable so as to give each and all a diminution of their individual loss, whereas in subrogation the aim is to shift the loss on those who would have been liable if there had been no insurance." The doctrine of contribution applies even in the absence of a contribution clause, provided both insurances cover the same subject matter, but usually a condition is endorsed on the policy providing that if at the time of the loss there is another policy covering the same property the company shall only be liable to contribute a rateable proportion of such loss, the object being to prevent a greater aggregate amount being recovered upon the various policies of insurance taken out upon the property than the value of the property destroyed, and further to limit the liability of each insurance company to pay its rateable proportion in accordance with the insurance policy. Let us take the case of premises upon which there are two mortgages, both the mortgagees being insured in different offices for the full value of the premises, the premises and site before the fire being sufficient to satisfy both mortgages. After the fire the sum awarded to the first mortgagee is sufficient to reinstate the buildings, but it is less than the amount of the first mortgage, whereupon the insurers of the second mortgagee refuse to pay on the ground that the prior incumbrances have paid an amount sufficient to reinstate the premises, although they are not in fact reinstated. These were briefly the facts in the very important case of the Glasgow Provident Investment Society *v.* the Westminster Fire Insurance Company, 24 S.L.R. 691. The Westminster Company further resisted the second mortgagee's claim on

the ground that in any case they were only liable to contribute the aggregate of the loss and no more, contending that a fire insurance policy being merely an indemnity against loss, the moment the loss to the subject matter by fire had been paid by any office all liability ceased, and therefore that the second mortgagee had no insurable interests because the first had received the whole loss. If the contention of the insurance company had been upheld, the result would be that a second or third mortgagee would not be entitled to recover under any policy that he had taken out if the first mortgagee received the full value of the loss sustained. But it will be remembered that everyone who has a limited interest in property has an insurable interest, and postponed mortgagees have an insurable interest apart from the first mortgagee and the owner, and, therefore, the Court held the second mortgagee entitled to be indemnified under his contract of indemnity. By the second mortgagee recovering, none of the parties receive more than the amount of their loss, so there could be no infringement of the great principle of indemnity.

Lord M'Laren said, in setting aside the contention of the insurance company that no more can be recovered in the aggregate by the different persons or interests assured, however numerous, than the amount of fire damage, "an insurance against fire by a postponed bondholder is virtually an insurance against the risk that, in case of fire occurring, prior insurances may not be available for his benefit, or, if available *pro tanto*, may not be sufficient to protect him against loss."

You will remember the well-known rule that there cannot be a double insurance. Lord Mansfield said, in the case of Godin *v.* the London Insurance Company (Burr, 490), "a double insurance only arises where the same man is to receive two sums instead of one, or the same sum twice over for the same loss, by reason of his having made two insurances upon the same goods"; but in the Westminster Fire case it was not a question of double insurance, because the same persons were not to have the benefit of the same policies. It is difficult to see how a contract between A and B could effect an entirely separate contract for a new consideration between C and D.

If the contention of the insurance company had been upheld they would have been pocketing the premiums of the second mortgagees and have kept the money. It must always be remembered that the insurance company might discharge their

obligations by re-erecting the premises, and therefore, even in the case of aggregate claims amounting to more than the amount of the loss, they have an optional alternative which they can avail themselves of without injustice. Where an owner makes a claim against an insurance company on the occasion of the destruction of a building by fire, the insurance company is not liable to make compensation for the loss of the rent, where the lease of such building provides the rent is to cease while the premises are uninhabitable through fire, unless the rent as well as the premises has been insured. If the rent is insured, then the rent clause attached to the policy would define the obligations of the insurance company. In most leases of dwelling-houses and buildings a clause as to the cessation of rent in case of fire is inserted, but I am afraid the owners rarely take the trouble to insure the rent, and are quite ignorant as to what their rights to recover lost rent would be in the case of a fire, which contingency they do not trouble to take into consideration.

A further great principle of insurance law is based upon the fundamental fact that the contract of insurance transfers the liability from one person to another so that the contract is *uberrimæ fidei*, that is to say, it is one which requires the utmost good faith on both sides. It necessarily follows that a complete disclosure must be made to the insurer of every fact within the knowledge of the assured which affects the risk to be transferred by the contract. If the assured keeps back information which effects the risk he will take nothing by the contract; further, the assured must exercise that care which may reasonably be expected from a person willing to act honestly toward the one to whom he looks for indemnity, and there must be no conduct which evidences a dishonest mind and a fraudulent disregard of the rights of others.

The arbitration clause which accompanies nearly every policy of insurance is an important factor, combined with the generosity and good sense exercised by insurance companies, in contributing to the dearth of litigation between the assured and fire insurance companies. This may, of course, be waived with the consent of both parties.

May I say, as a lawyer, and by way of parenthesis, that this spirit of good sense and compromise which prevails in settling fire claims is to be welcomed in the best interests of the community as in the ultimate resort the interests of every profession and

calling, including the law, are in common with those of the community. The effect of the arbitration clause is to exclude the jurisdiction of the courts, and to oblige the parties to concur in appointing arbiters for the purpose of determining damages.

After all, courts of law, although eminently suited to determine the question of liability, are not the best tribunal for the assessment of damages, and if a point of law arises in the course of the arbitration, there are ways and means, which it is not necessary to go into, whereby the decision of the courts can be obtained thereon.

I should like, before closing, to refer to the average clause in insurance policies upon agricultural produce. The condition usually stipulates that if the sum insured on the breaking-out of a fire be less than three-fourths of the value, the company shall only be liable for such a proportion of the loss sustained as the sum insured bears to the total value thereof.

This makes the insured his own insurer to the extent of the difference between the amount of the policy and three-fourths of the value. The question sometimes arises, What subject matter does the policy include? Does it include green crops, or is it only limited to the produce in the stackyards? This is a question of construction of the policy, and. in my opinion, the produce to be included in the valuation is such produce as can be damaged or destroyed by fire, and this would, of course, include green crops. I have read with great interest the paper read before your Society by Mr. Thomas Waddington, in which he points to instances in which root crops have been damaged by fire while actually in the ground.

It seems to me that cases in which root crops can be so damaged must be so rare that I do not think it is ever in the minds of the parties at the time the insurance policy is taken out they should be included in the valuation of the farm produce, although it may well be held that farm produce does include growing crops of clover, which, of course, would come under the category of green crops, as it is quite evident that they are liable to destruction by fire.

There are, of course, many other legal matters which vitally affect fire insurance, and upon a subject which has afforded much material to writers of voluminous text-books, it would be absurd to presume that one could even cursorily traverse the whole field of law relating to fire insurance within the space of one short hour.

I trust, however, that I have dissipated some difficulties and elucidated some problems, and, above all, that you have been confirmed and strengthened in the opinion that the common law of England, assisted here and there by statutory enactments, as applied to fire insurance, is appropriate to present-day circumstances, and on the whole does justice to both insurers and assured.

STRAW PLAIT BLEACHING AND DYEING, AND STRAW HAT MANUFACTURING.

By E. F. WILLIAMSON.

A Paper read before the Norwich Insurance Institute, 23rd January, 1906.

PART I.—INTRODUCTORY.

In selecting this subject for a paper I have possibly fixed upon one of the most difficult which I well could—not because of the intricacy of the trade itself (which is, comparatively, a simple one), but because it is a trade upon which practically none of those engaged in it will tell much; and there is not, so far as I can ascertain, any authoritative text-book in existence. Consequently, I have been forced to gather my information piece by piece from numerous sources—afraid to ask too much here or peer too inquisitively at a workman there; because, should a manufacturer once know my object, I was well aware nothing more could be learned from him. However, thanks to friends to whom I owe much, I think I have been able to cull sufficient facts to enable me to put together an understandable account of the trades with which I am to deal; but, if this is not so, I must claim indulgence on the grounds I have stated.

District. When thinking of the manufacture of straw hats and of the kindred trades, one naturally picks out Luton as the town associated with these industries since the days when we studied geography. 'Tis true, Dunstable has the claim of seniority, and St. Albans still has a certain amount of the trade; but, year by year, the tendency is for it to centralise

in Luton, which is now one of the fastest growing places in the kingdom. It should, however, also be mentioned that there are several large straw hat factories in London.

Speaking generally, the trade is in the hands of many small manufacturers rather than monopolised by a few large ones, although there are cases where as many as two hundred hands are employed by one firm—this is, however, the exception rather than the rule. In the outskirts of Luton we find the bleaching and dyeing works covering, with their drying grounds, large areas, and also the premises of the manufacturers of the gelatine used for stiffening by the makers of straw hats.

History of the Trade. Straw plaiting was introduced into Britain by the ill-fated Mary Queen of Scots, who brought over to Scotland a colony of plaiters from Lorraine. This was in the latter part of the 16th century, and, owing to the misfortunes of their royal protectress, this little band of workers soon fell upon bad days; but, struggling on, in course of time they were taken under the patronage of James I. of England and VI. of Scotland, who brought them to Luton. This town was probably selected because of the eminent suitability for the plaiters' art of the wheat straw grown in the neighbourhood. A bright, clean, tough straw is necessary, and the utmost care and despatch must be taken to get the crop dried, carted, and stacked. The straw is allowed to dry in the sun before binding, and the two upper joints only are selected for plaiting. In some cases the *whole* straw is plaited or made up, and in others the pipe is split by means of a small tool, called a "straw splitter," into from two to twelve pieces, which are then worked into a fine plait. But it is hardly necessary to dwell on this portion of the industry, for it has all but entirely died out; such, however, is not the case with the bleaching and dyeing and the manufacturing trades, which have of late years made very considerable progress. In fact, the self-same circumstance which has spelt ruin to the plaiters has resulted in the extraordinary progress of the manufacturers. The imported plait, which may be looked upon as raw material to the hat-maker, is in many cases cheaper, and in others more suitable for making up, than the home-made article. This ample supply of raw material has meant everything to the maker of straw hats, as he can now turn out his finished article in enormous quantities at a price which before was impossible; and Luton not only supplies headgear for men, women, and children through-

out Great Britain, but also exports an enormous quantity to the Colonies, India, the Continent of Europe, and, in fact, all over the civilised world.

Sources of various Plaits.

This imported plait, which has worked such a change for Luton, comes from many places, but chiefly from China and Japan, Switzerland and Italy. Besides plait, there is another product largely used in Luton, viz., chip, which is made from fine wood shavings, and chiefly employed in making "fancy" hats for ladies. (In this paper, however, the term "plait" must be held to include *chip*, as the two are found side by side in the bleaching and dyeing works and in the factories.) Wheat straw is chiefly used for plaiting—except in Japan, where barley straw is largely employed, and in Switzerland (from whence the best fancy material comes), where both manilla and hemp are utilised. This Swiss fancy plait is sent to Luton bleached or dyed ready for making up in the factory.

The great bulk of foreign plait is received in the port of London, and either goes from thence direct to Luton or is sent to the Mark Lane sale-rooms, where the leading straw plait merchants attend to buy their stocks. The Plait Hall in Luton, once the scene of considerable activity when the local plaiters sold the product of their toil there, is now only used by small buyers in an ever-decreasing extent.

Some amount of the imported plait is also dealt with at Manchester and Glasgow.

To give a list of the various kinds of foreign plait would be an impossibility, there being, I was informed by a leading firm of plait merchants, at least 700 varieties, most of which are made in from eight to fifteen widths. Here are a few of them :—

Chinese Plain.	Chinese Fancy.
Maslienpoo.	Rustic.
Speelless.	Pearl-edge.
Sancolien.	Diamond.
Laichow.	Stoya.
Pekin.	Satincord.
Powtee.	Undertwo.
Woh Tanieng.	
Tang Ming Tze.	
Tientsin Mottled.	
Chefoo Mottled.	
Tuscan.	

JAPANESE PLAIN.	JAPANESE FANCY.
5 End Cordedge.	Bedford.
7 End Cordedge.	Chip Granite.
Alice.	4 End Satin.
Jumbo.	6 End Spiral.
Rustic.	Herring-bone.
Mackinau.	

PART II.—THE TRADES.

Bleaching. I think I have mentioned that a very little indeed of the home-grown straw is now used, but I am told that such as is possesses the best colour for what are usually known as "white" hats. This English straw is subjected to the "old" or "dead bleach," which consists of a solution of oxalic acid, salts of tartar, and salts of sorrel, into which the plait is laid for a short time—say, half an hour—it being then taken to what is known as a "steaming chest," which is a small compartment in which a pan of sulphur (generally called brimstone in Luton) is placed and lighted. The plait remains here during the night, and in the morning is removed to be thoroughly dried, either in the open air or in a steam heated drying-room.

The *foreign plait* is treated with the "new bleach." In the first place, however, it should be stated that only that of good quality is bleached, the ordinary and inferior being dyed. As a preliminary, the plait is strung, *i.e.*, tied with string into coils, and is then soaked in a weak solution of water and oxalic acid—either warm or cold—afterwards being thoroughly washed in trays of warm soapy water. The plait is now ready for the bleaching proper, and is placed in large lead-lined wooden vats containing the bleaching liquor, consisting of a mixture in water of peroxide of hydrogen, silicate of soda, hydrochloric acid, and sodium—the last ingredient, however, being only used for *straw* plait bleaching, and is not employed in the case of chip. After 48 hours in this vat the plait is removed, rinsed in cold water, and then again placed for half-an-hour in a weak mixture of oxalic acid, soda, and salts of sorrel. It is then taken out and "rodded off"—that is, hung upon wooden poles or rods about 5 feet long—and placed for the night in a "steam chest," as before described, afterwards being dried in the open air or by steam heat in specially constructed

buildings, the fittings in which are so arranged that the same rods fit the racks which they contain. In some cases hot air from chambers over the crowns of the boilers is blown by a fan through metal ducts into the drying compartments, but usually steam heat is employed. After drying, the plait is taken back to the steam chest for an hour and a half, and then nothing remains but to "bunch" it ready for conveyance to the manufacturer or elsewhere. It should be mentioned that some plait may have to go through the bleaching process several times before a good colour is obtained, as much as a fortnight being necessary to complete the process in some instances.

The various bleaching powders are, in large works, mixed by machinery, and, latterly, the residue from the liquor has found a market, and after being dried in ovens (either steam or fire heated) is sold for paper glaze and also as a ground for colours.

Dyeing. The dying process is very simple so far as the actual work in the dyehouse goes, the important part in the operation being carried out in the chemist's laboratory, where the many colours are scientifically prepared by a man specially qualified in this branch of work. If the plait is to be dyed a delicate tint, it is first bleached in order to get a pure ground to take the colour.

The dyehouses are usually lofty shed buildings, with ample ventilation in the roof to let out the clouds of steam which rise from the numerous coppers, which are ranged round the sides and very often down the centre of the buildings. The coppers generally used are not of the shape and construction usually seen, but are like a wooden box lined with copper sheets. Steam heat is, so far as my experience goes, invariably employed, and the method in use is the injection of a jet of live steam directly into the liquor to be heated. The familiar jacketted copper is rarely or never seen. After removal from the copper, the surplus moisture is extracted by means of a hydro-extractor (locally termed a "wringing machine"), and the plait is then taken off to a drying shed. The number of times the plait may pass through the dye liquor, and the time it may remain in, varies in accordance with its quality and the colour required. From one to four days is the usual time needed to complete the process.

Aniline dyes are now chiefly used, but logwood and copperas are also employed. The mixing and preparation of the various colours is work of the greatest nicety, and any special shade which

may be produced is very carefully guarded from prying eyes, as, of course, a reputation for originality and taste in this respect means prosperity to the firm concerned.

Subject to the exception already noted, Luton practically holds an entire monopoly of straw plait and chip bleaching and dyeing, these articles being sent form all parts of the world for treatment. One of the largest firms in the trade employs a staff of five foreign correspondents to deal with their distinctly *foreign* trade, besides which they do an immense colonial business; and, of course, the local manufacturers make up an enormous quantity of the plait.

Manufacturing.

After having been bleached or dyed, as the case may be, the plait goes to the factory to be made into some choice design, destined to be elsewhere turned into a marvel of millinery, or, maybe, is turned out, complete from the factory, a man's ordinary sailor. The first process is to pass the plait through what is called a "plait mill"—a very simple contrivance consisting of two rollers, either of wood or iron, through which the plait is run to smooth it out preparatory to the sewing process. These plait mill rollers are grooved so that, if desired, the edge of the plait can be left untouched. Plait, if too dry, does not sew so well; so it is usually kept in a damp place or is sprinkled with water by the machinist before sewing. The sewing machines used are of special design, and can be, for our purpose, divided into two classes—the "ordinary" and the "concealed stitch" (or "box") machine, which names are, I think, sufficiently indicative of the difference between them. They are generally treadle-worked, but in the large factories an electro motor is used. Both girls and men are employed at this work, and they become very skilful, being able, almost entirely without measurement or mechanical aid, to turn out their work to the required shape and size. It is very interesting to see a worker, with the aid of teeth and fingers, form what is called the button—which is the centre of the crown, and the sewer's starting point—and from thence rapidly going on round by round, shaping crown and brim, in accordance with the block to which he or she is working, until the hat—still, of course, limp, and, to the unknowing one, shapeless—is completed ready for the next process in its evolution.

This is *stiffening*. The hat is dipped in a pan of warm liquid gelatine and is then hung up to dry, either in the blocking house or in a special drying room, preparatory to being pressed or

blocked. The gelatine used in the stiffening is made locally from hides and skins, and is delivered to the manufacturers in flat pieces, or slabs, like glue. It is first soaked in cold water, and then placed in a pan and kept to the required temperature and consistency by steam heat.

The blocking or pressing, to which we now come, is done both by machinery and hand. If by hand, a wood block is placed in the crown of the hat and the block is then fixed on a blocker's bench spindle, which can be moved to, and made stationary at, any angle. The operator presses or blocks the hat with an ironing box, the irons or heaters for which are heated in the boiler fire in a small factory; but in the larger ones, where the boilers are away from the blockhouse, special furnaces are provided for the purpose. A blocking machine is the most imposing piece of mechanism found in a straw hat factory. It consists of a steam or gas heated pan, over which is suspended a hollow circular press, the bottom of which consists of a rubber bag. When the stiffened hat has been placed in the pan, a felt pad is placed over it and the press is then clamped down firmly and water is allowed to fill the rubber bag. The pressure exerted—from 100 to 200 lbs. to the square inch—blocks or presses out the hat to the required shape. A hand pump is attached to some of the machines, by which the water pressure can be increased—this being necessary in the higher parts of the town, where the pressure in the water mains is less than 100 lbs. The hat is kept in the machine for about 4 minutes, and emerges practically a finished article.

A brim press is also employed in the case of sailor hats for the purpose, as its name implies, of pressing the brims or verges perfectly flat. It is a small appliance fixed upon a bench and consisting of a flat steam, or possibly gas-heated, plate, upon which the hat is placed, the surface being first, however, covered with a damp cloth. A block is placed over the hat and the press is screwed down in exactly the same way as the ordinary copying press in an office.

After pressing, white hats are in some factories placed in a steaming chest, the same in principle as those described in connection with the bleaching process, for the purpose of bringing up the colour and removing any soils received in the process of manufacture.

The blocked or pressed hat has now only to go to the finishing room, where girls insert the crown linings—called "tips"—and the

leathers or flannels, and then affix the bands—locally known as "nets." Then before the hat leaves the factory it is examined by the proprietor or his foreman or forewoman, and any spills—*i.e.*, odd pieces of straw—spoiling the symmetry of the plait—removed or other faults detected so that only an article in keeping with the reputation of the workshop may go out.

It will be observed that steam heat is in much request, and to provide this a boiler of some kind is found in every factory. The necessary steam pressure, so far as straw hats are concerned, is only 10 or 12 lbs., and the usual class of boiler is the one known as a "saddle boiler." This is enclosed by brickwork and has a brick flue, and may be looked upon as a safe appliance from an insurance point of view. Another type of boiler in use is the ordinary vertical one, this being more especially used in those factories where felt hats are made as well as straws. This boiler, of course, has an iron flue, not infrequently of some length, and often used as a means for drying stiffened hats; besides, it is a convenient appliance which can be placed in any odd corner. I once saw one neatly ensconced under a wooden staircase. A horizontal boiler in brick setting may also occasionally be seen.

In some factories will be found one or other of the following appliances:—A *goffering machine*, used for crimping plait and consisting of two cogged wheels, one of which is heated by means of a hot iron passed through its centre; a *hood stretcher*—an entirely non-hazardous apparatus used for the purpose its name denotes; or a *buckram machine*, which is a somewhat larger affair, rivalling the blocking machine in size and appearance. This last named is used for making bonnet or hat shapes of buckram, a stiff canvas-like material. Gas jets with flexible connections are required to heat the moulds, which form the essential part of the machine. These three machines are not in general use amongst the manufacturers, but occasionally one comes across them.

During some seasons the ordinary stiffened straw hat is out of favour with ladies—as it is to-day—and then the factories are given over to making fancy straws on wire shapes, or hats made without straw at all, consisting of wire shapes covered with chenille, chiffon, plush, velvet, furs, skins, astrakhan, etc. The wire shapes themselves are very simple affairs made by hand away from the factories, and, when this fashion rules, the work is done practically entirely in the finishing room, no steaming, stiffening, or blocking being required, nor even the aid of a sewing machine,

as the chenille, straw, or other material is stitched on by hand. However, the sailor and galatea shapes are always in vogue, so one usually finds the steam plant in work, if only to a small extent. Some factories are now, however, springing up in which nothing but this making of millinery is to be done, there being no boiler, blocking house, or other customary feature of the straw hat factory.

The blocks to which I have so often referred are made by block-makers from designs sent in by the manufacturers. Alder and poplar are the woods chiefly employed on account of their being tough and pliable; compo and cast-iron blocks are also used. However, cases where any of these are made in the straw hat factory are very rare, but of course, when they are, the additional risk incurred has to be taken into consideration.

PART III.—FIRE HAZARD.

The bleaching and dyeing works, are of course heavier risks, from an insurance standpoint, than the factories, but they differ very much in character, some consisting of a set of well-divided buildings with each process kept to itself; whilst, on the other hand, there is one I know where every process both of bleaching and dyeing is carried on in one square, undivided storied building which has in its centre a steam boiler, with the shaft running through all the floors, the top one of which—locally known as the "horse"—has louvre-boarded sides to allow of a free access of air to dry the plait. It is hardly necessary for me to say this forms the worst type of risk in its class.

To return, however, to a general consideration of our subject, we shall see in most works one or more large buildings devoted to the storage of plait in bales, and here we shall usually find the largest amount of insurance is required, as £1000 worth of plait in bales takes up surprisingly little room. The actual and apparent risk is not great—supposing, of course, the building is detached or properly separated from others—but the lighting arrangements in particular should be carefully looked to, as should a fire once get hold a very heavy loss is inevitable, for the value of the stock in such a building in a large works may be anything from £10,000 upwards. Moreover, plait is practically worthless after subjection to a considerable amount of heat and smoke.

So far as the bleach houses are concerned the risk in the process is small, and the same may be said of dyeing, the buildings dovoted to these purposes being always awash with water. Sometimes, however, one finds in an odd corner of a dyehouse a small pipe stove used for drying patterns to test the colour. The drying itself is a small matter, but the fixing and position of the stove should be carefully observed.

Some of the dyes, before going into the coppers, are mixed and boiled in small vessels over gas rings, and it is an improvement if this work is carried on in a detached building set apart for the purpose.

The steaming chests, to which the plait goes after passing through the bleach, always appear to me disquieting. The plait is placed in them and left for many hours unattended—often all night—and should a piece of plait be insecurely hung upon one of the rods so that it falls into the sulphur-pan a fire is the inevitable consequence. There is a further danger when the floor of the steaming chest is of wood—as is often the case—as one frequently finds the sulphur is placed to burn upon a small square piece of stone not more than an inch in thickness and which quickly disintegrates under the action of the burning sulphur. As a counsel of perfection the floor of the chest should be of incombustible material; but if this be impossible, the portion on which the sulphur is placed should be thoroughly well protected with lead or slate. Moreover, it is highly desirable—as an occasional accident in these buildings is almost unavoidable—that these chests should be isolated or at least efficiently separated from the main premises. This will be found to be the case in some of the largest works, but, unfortunately, Fire Insurance Companies cannot confine their operations to model risks, but have to a large extent to take things as they find them.

We now have to consider the drying houses, which are almost invariably steam-heated, hot air, however, being used in some cases. Direct steam from the boiler is employed, the steam pressure being from 40 to 50 lbs.; thus the actual heat is not in itself dangerous. The pipes run in series practically covering the whole floor, and the wood frames upon which the rods of plait are placed are arranged over them, with passages for the workmen to place and remove the stock. One feature of hazard is the accumulation of particles of plait under and around the steam pipes, and this point should have special attention from the management; in

fact, it should be a condition of the insurance that these drying floors are regularly swept out. Another and possibly more serious item of hazard is the presence of gas jets. The drying houses are, when in use, most densely crowded with plait, and anything in the nature of a naken gas-light—to say nothing of a jointed bracket—cannot be thought of. In my opinion the only safe gas-light in such a building is a burner entirely enclosed in a lantern similar to the familiar type of street lamp. The top floor of these drying houses has usually, as mentioned before in this paper, louvred sides, and is termed a "horse"—for what reason I know not—but as this is used for "air" drying only, the steam pipes not entering this portion, the additional hazard is one of construction rather than process.

So far as I know, the objectional pipe stove is never used in these drying houses.

In some portion of a large Bleaching and Dyeing Works will be found the experimental shops and dye stores, where will be encountered various gas rings with possibly rubber connections, which need attention. The storing of sodium (known in the trade as "hell-fire Jack") is also a feature to be inquired into.

Mechanics' shops for carrying out the necessary small repairs are also found, as well as a mess house, where the workers take their meals, the latter of course containing a stove, which should be carefully looked to, as it frequently happens that this is a portion of the premises into which the proprietors rarely or never set a foot. However, I am afraid I am drifting into generalities which are applicable to risks of all classes and not solely to the one we are considering.

To summarise, regarding these Bleach and Dye Works, it appears to me that careful management, involving, as it naturally does, supervision by responsible persons, and, more important still, cleanliness in the drying houses, is the great safeguard against outbreaks of fire and goes far towards making the insurance an eligible one. A dirty, ill-managed Bleach and Dye Works is most decidedly to be fought shy of.

Factories. Now we must turn our attention to the factories, where we shall find several features of risk identical with certain of those already alluded to in the Bleach and Dye Works, such as the presence of a steaming chest and a drying room, to which the remarks already made will here again apply.

I have, in the earlier part of this paper, referred to the steam boilers, which are usually in the blockhouse, and are not generally used for power but for providing steam heat, which is required in every process. If power is needed an electric motor is introduced for driving the sewing machines.

Generally speaking, blocking machines and brim presses are steam-heated and non-hazardous, but occasionally one sees a gas-heated one, and then the gas connection needs looking to. An ordinary piece of rubber tubing is not good enough and should be replaced by something more lasting and secure.

A word should be said about the steam pipes, which are everywhere in a straw hat factory, and in my experience of business people I have never come across any class so hard as the Luton manufacturers to convince of the necessity for running these apparently harmless tubes in free positions, so that refuse and accumulation of straw *débris* may be readily and regularly removed. 'Tis true the steam pressure is usually only 12 lbs. to the square inch, but attention to this point is necessary, although to suggest it not infrequently leads to a lengthy argument with the assured.

It ought also to be pointed out that straw-hat manufacturing is often carried on in private houses and other places ill-adapted for trade purposes.

In every factory a certain amount of *spirit polish* and *chip oil* will be kept, but the stock is usually small and thus can hardly be said materially to add to the fire hazard.

In summarising, here again I am led to the conclusion that the first and foremost point to be considered in estimating the fire hazard is the degree of carefulness and cleanliness evinced in the management. A straw hat factory offers endless opportunities for untidiness, and the sewing room, even in the best of them, always has a considerable quantity of odd pieces of plait about on the floor. If these are allowed to accumulate near fireplaces or round the steam pipes which encircle the room, obvious danger exists. Further, there is the drying room, which always needs care to keep it anything like clean. Then if we are satisfied on this very, in fact most, important point of tidiness, we have to consider whether any direct fire heat is used to dry the hats after stiffening and from what source it is derived—whether from boiler flue or pipe stove, and the sulphur steaming chest has also to be thought of.

Many straw hat factories turn out ladies' felt hats during the summer after the straw trade is over for the season. This does

not form part of my subject, but must not be neglected in considering the fire hazard when a risk comes before us in our everyday business.

Spontaneous Combustion. When seeking information for this paper I made very careful inquiries from people in the trade as to whether spontaneous combustion had been the cause of fires in plait warehouses, but I could not secure any evidence that such was the case. There is no doubt that a bale of *damp* plait would heat spontaneously, but it was explained to me that if, on arrival at the warehouse, any sign of dampness were detected the bale or bales affected would be immediately bleached or dyed, as otherwise the plait would be irretrievably ruined. Thus we have the self-interest of the plait merchant ranged on the side of the Fire Insurance Company, and an exceptional amount of care to guard against this danger may be expected.

Moral Hazard. A point upon which I have not touched up to the present is the question of moral hazard. It is needless to say how important this is in its general bearing upon our business, but I suppose it will be readily conceded that it is much more to be considered in certain trades than in others. Straw hat manufacturing is one of these industries being largely in the hands of what may be termed "little men." In Luton a man starts manufacturing on his own account so soon as he can manage to hire a small place for the purpose. He probably has little or no capital, and it therefore follows that should a bad season occur before he becomes established he goes to the wall, and going, becomes careless, to say the least of it. A fire in such circumstances *may* right him, and would in any case serve him in good stead when he has to meet his creditors. Withal, to "give the devil his due," I believe the financial aspect of the trade is now much better than it used to be.

In concluding this paper I can only say that I am conscious of many deficiencies in it, but I trust it has afforded some information on a trade the ins-and-outs of which have not, so far as I know, previously appeared in this or any similar publication. Before laying down my pen I wish to acknowledge my indebtedness to the following Luton gentlemen, Mr. S. C. Weston, Mr. Weatherhead, Mr. G. H. Barford, and others too numerous to mention, for assistance in many ways. Without their kindly aid this paper could never have been written, and to them is largely due any merit it may possess.

SOME MODIFICATIONS AND DEVELOPMENTS IN FIRE INSURANCE BUSINESS.

By SAMUEL J. PIPKIN.

A Paper read before the Insurance and Actuarial Society of Glasgow, 6th November, 1905.

HONOURED as I felt myself on receiving an invitation to address the Insurance Institute of this city, I was yet perplexed rather than gratified when I had accepted it. There arose before my undecided mind the grave question of the subject, which, while one of interest and use, should also be one for which, if I could urge no special fitness, I should at least be not the most incompetent to deal with. For some time the silent Quaker in solemn meeting could not feel less inspiration than I did to respond to your honorary secretary's polite but pressing invitation to name the topic, he having already named the day. But gradually a clarifying, if not inspiring, influence crept over me—I looked to the past of our great business and I looked to the future of it. Casting a regretful glance behind me, I thought of Charles Lamb's apostrophe to the dead years of long ago, and remembered that the past, although everything, is really nothing to us, while the mighty future is as nothing, while yet it is everything. To deal with the past were to lament, to deal with the future were to prophesy—the one is useless, the other foolish, so I was driven to think of the present, the only possession we have, the one current coin that procures our daily bread of action, of thought, of life. Then let the dead past bury its dead, let the future trouble us not as the future, for it becomes the present day by day and hour by hour. The present is not only all we have, but all we may ever have. Where, then, do we stand to-day in this great business which we are handling and which it should be our highest aim to handle wisely for the benefit of others and for the benefit of ourselves?

The constant repetition of words in daily conversation, whether of business or social life, tends inevitably to dull the sharp edges of their meaning and to accustom the mind to incorrect uses of them, just as the facets of a diamond through years of wear lose their clearness of outline and the brilliance of their lustre. Of no word is this more true than of the word "insurance" as applied to fire business. Originally signifying the making certain of recoupment of a loss of property occasioned by fire, it has come to be used, even by those engaged in the practice of the business, and who ought to know better, as the guarantee of the payment of an agreed sum of money in consideration of the receipt of a smaller sum, called the premium, calculated in proportion to the larger sum, called the sum assured. Thus it is that we so often find a man demanding the amount of his policy simply because he has paid a premium calculated upon that amount, regardless of whether the loss he has sustained reaches that figure. After 200 years of the practice of fire insurance, we have yet very frequently to explain that a fire policy is simply a contract to make good to the holder of it the value of the actual loss of property he has sustained by fire up to and not exceeding the amount of his policy. Judges, juries, and arbitrators have not infrequently fallen into the error of awarding payment of what is called the "sum insured" simply because it is the sum insured, without proof that the loss has reached that amount. The very words "sum insured" tend to this error, for they imply that a sum is insured, whereas in reality it is the *person* who is insured for an amount which at the time is not known, because it depends upon the amount of the loss, and can never be larger in any case than the amount of the policy. You will forgive me emphasising this (to you) very elementary truth, because it lies at the root of all sound conceptions of fire insurance, and marks the point from which some modern departures we are about to consider have their start. While turning over in my mind the subject upon which I should address you to-night, and before having arrived at a decision, two incidents occurred which crystallised my resolution. One was, in the course of an informal conversation with two or three brother managers of companies, hearing one exclaim :— "And why should we not issue valued policies?—depend upon it, we shall have seriously to examine whether we cannot do so, seeing that the public are demanding them." There was a shock of surprise, because these words came from the lips of an experienced veteran in our business, and because, further, they seemed to imply

that it is sufficient that the public should ask whatsoever they will to make insurance companies grant it. The second incident was that of a customer who wanted a policy to insure him the payment of a sum of money equal to the cost of keeping up a garden and pleasure grounds attached to a mansion he was renting, in the event of the house being so destroyed by fire as to render it uninhabitable by him, and for the period it remained uninhabitable, because by his lease he was bound to keep the garden and grounds in order, even while not being able to live in the house and enjoy them. This seemed to me very much like a claim for loss of enjoyment!

Since then one of our old companies has given notice to ask for powers to "grant insurances or contracts of indemnity or guarantee against any loss arising directly or indirectly *from any event or cause whatever*." So that every possible loss that can befall a human being is to be covered! What a world it will be! What little need of care and circumspect action! A complete and universal abolition of the debits in the Profit and Loss Account of the World! Surely the Financial Millennium is at hand, and the word "loss" will disappear from the next dictionary!

We shall need no orphanages, for parents will insure for their children the cost of the education that would have been given if their parents had not died, the amount to be paid to executors, who may or may not spend it for the purpose designed by the insured.

We shall need no bank deposits from which to draw for support when ill-health or loss of employment befalls us. Only pay premiums to a company and thrift may be discarded.

Possibly an onmibus sort of policy will be issued contracting to pay all losses that may arise directly or indirectly from any cause whatever. Why should the separate risks be enumerated? No doubt there will be some actuarial difficulty in fixing a premium for indefinite risks, but an easy solution will be for a man to pay all he has to spare, over and above the mere cost of his daily living, into the coffers of a company which will give him, when he needs it, the necessary funds to pay funeral expenses, sickness expenses, renewal of stolen, lost, pawned, or worn-out clothes, a new leg for the one taken off, a new house for the one he burns, new stock for that which has become unsaleable, honeymoon expenses for a second marriage, and doctor's and nurse's fees for every childbirth, and as no cause is expected, why not the money-cost of youthful indiscretions, in the shape of police court fines?

Of course, the policy will be conditionless, non-contentious, and valued, like a Bank of England note. When this comes to pass the policies of a company granting such insurances will be better investments than its shares.

But we need waste no more time over the heresies that are being dreamed of, for there are heresies in existence which it may be more profitable to look into.

Now these valued policies that are being occasionally asked for, and which some managers are coquetting with in a dangerous way by using language that appears on its face to mean something which in reality it does not mean, that seems to give what is asked and yet does not actually "do the trick," but which may be said, in plain truth, very often to trick the insured—what are these valued policies?

They are dealings in futures, making a price to-day to be paid twelve months hence for something the value of which at that time no living soul can now judge. When you get a cotton market here Liverpool will be very pleased to teach you how to do business on this method.

It is a species of forward contract, as though one should say to a Glasgow corn merchant—"Fix to-day the actual price, the absolute sum you will take for 100,000 bushels of wheat to be delivered and paid for any time I choose, perhaps in twelve months' time."

It is agreeing to-day the value to be paid for something in a year or even longer period. You see at a fair a very nice horse and think him worth £100. Would you to-day agree to give that price for him this day twelve months?

There is no doubt plenty of business can be done on these methods; but is it safe in regard to a depreciating commodity without reference to condition at time of delivery?—for in such contracts as I have heard of there is no protection to the company in the shape of a provision as to condition of the property, the subject of the insurance, when the fire comes. Would it pay both buyer and seller? Unless it does, it is not legitimate business but a reckless gamble.

Now let us look at the forms this species of gambling is assuming.

The most common type is that of undertaking to pay in the event of total loss a sum agreed upon beforehand on the issue of the policy in respect of pictures. An inventory of such, with the value of each picture set against it, is referred to in the policy,

and is thus made a part of the policy. The undertaking is in the form of a note in the policy to this effect:—

"It is hereby declared and agreed that in the event of loss the amount set opposite each article in the above-mentioned inventory shall be accepted as the value of the same.

Now you will notice this is in effect an undertaking actually to pay these values at any time within the next twelve months, the usual term of a policy, in case of total loss. Should the loss be only partial, presumably the value of the article damaged, as stated in the inventory, will be taken as the basis of settlement, and the partial damage arrived at by a discount from this. The point is that, say, on 1st January it is agreed that the values of pictures for the next twelve months shall be considered to be the values fixed on 1st January. Now the value of a picture depends upon several conditions, events, or circumstances. Fashion, sentiment, death of artist, plentifullness of money, state of weather at time of sale, all affect its value, and, consequently, at 31st December it may be worth in the market a very different amount than on the preceding January. And yet in December, should a total loss occur, the company must pay the value at the preceding January, perhaps double the amount of its actual value when destroyed. Let us assume the owner knows of this fall in value and is not keen to retain the picture and is in need of money; is it a very great libel on human nature, at any rate as assessors know it, to admit the possibility of the existence of such a policy providing a strong temptation to the insured to sell it to the company through the fire mart and pocket the high price which in no other way could be obtained? Companies know such things are done even where there is no valued policy and consequently no absolute certainty of securing such ill-gotten gain, the insured trusting to the amount insured and his being able to browbeat or cajole the company into payment. How much easier with a valued policy! If this be so, then it is against public morals that these contracts should be issued, and although it is no part of the business of a trading company to specially consider public morality *per se*, yet it is not the business of a company to issue contracts which directly tend to the fostering of dishonesty by frauds upon itself. It is no guess, nor gloomy prophecy, to say that if such contracts become general the rates of premium must be raised, because we know that in some of the States of America, where the law, strangely enough, compels insurance

companies to grant these policies, the rates have had to be increased very considerably, in one State as much as fifty per cent. In other words, honest people have had to pay 30s. instead of 20s. to provide for the unholy gains of rogues, made possible and easy by this senseless legislation. Shall we in Great Britain voluntarily transact our business in this way, that rogues may flourish and honest people suffer? Will the insuring public be willing to pay £30,000,000 per year in fire premiums, instead of £20,000,000, in order that the Companies may pay values which are not destroyed?

But it may be said we should grant such policies only to honest, well-known people worthy of trust. The first answer to that is the dictum of a cynic (not, therefore, necessarily untrue) that every man is honest until the sufficiently strong inducement to be otherwise comes along, and the mischief of this kind of insurance is that it provides the sufficiently strong temptation, and thus a dignified and even noble and beneficent business, designed to lift the burden of innocent loss from the individual to the community, is degraded to a systematic perversion and corruption of public honesty. Although your great countryman said most of the population are fools, I am not paraphrasing that by assuming they are rogues; but temptation and opportunity play havoc with human virtue, even with that of the strongest of us.

But suppose we could safely pick our customers without tending to corrupt them, to whom we might grant such policies, the effect would be we should be selling our goods at two prices, or giving greater value to A. than to B. for the same consideration from each, for no one suggests that we should charge a higher rate for the valued than for the ordinary policy. Even if we did so we should be deliberately setting a price on dishonesty and knowingly undertaking the making good of losses occasioned by wilful fires.

But the demand for these policies does not stop a picture insurance. It is extending to insurances on general household effects fostered by the ignorant or disingenuous advertisements of firms who pretend to be seeking the advantage of the public, while in reality they are seeking their own interests only. What nonsense it is to tempt people to rely upon an inventory and valuation of carpets, curtains, furniture (silk, satin, and leather covered), tables, chairs, sideboards, bedding, and wardrobes, and the thousand and one articles that make up the contents of a home,

as the proof of loss in the event of a fire. Most of us know to our cost, especially if we entertain much, or have young children, or lively young men and maidens in our homes, what havoc is wrought in twelve months upon the contents of a house. Nor would it be safe for the company to undertake to pay the values as per inventory, less a percentage for wear and tear, because inventory makers would soon adjust this by over-valuation —it would speedily become a natural thing to put on a percentage to meet the discount the companies adopted.

There arises the question also, how often should these inventories be revised? Policies run for years—that is, they are renewed from year to year, and is it supposed that the insured would revise the inventory at short intervals of two or three years? If he employed a valuer of known repute to do this, and none other could be accepted by the company, the cost would be a heavy addition to his premium. It goes without saying that the companies could not bear the cost, for it would, in the case, say, of a £1000 insurance for which we charge 20s. per annum, entail a fee of at least three years' premium for the valuation, which must certainly be re-made in three years' time, thus doubling the cost of insurance for this item alone, to say nothing of the extra cost of the more numerous fires which experience shows would happen.

But assuming for the moment that an inventory and valuation were possible in every case, of what worth would it be to the assured? At most it would only be evidence that on a certain date such articles were in the house; it would be no evidence they were there when the fire happened, and were actually destroyed by the fire. In the case of partial damage, the articles would speak for themselves and the inventory would be unnecessary, and even useless, as no assessor would accept a list in preference to his own eyesight. In the case of total destruction it would be no proof of what was actually destroyed. The insured could at most say—"This is what I had some time ago"; but what is required in case of loss is, What was there at the time of fire? Proof of loss does not mean proof of the value of things asserted to be lost, but *first* proof of what was lost and *then* proof of its value. All the generosity of companies and all the credulity of assessors (if they have any) would not lead to the acceptance of the insured's mere assertion that such and such articles were destroyed. At most, the inventory would only help an honest man with a bad memory who had no other person living in the house with him—an honest

hermit—to make up his statement of claim. But we have not to deal with hermits, generally speaking. The species is so rare that I doubt if any company has an insurance on its books of this nature, and certainly no company would have such knowingly.

It is said, "Oh, but an inventory is very useful, because once made it is quite easy to delete from it all the articles worn out or sold or given away, and to add those subsequently acquired." No doubt it is easy to do this, but in how many cases would it be done? Easy, yes, very easy for the dishonest man, who knows he is going to have a fire, but just as easy for him to have a "moonlight flight" and clear out his goods, or the bulk of them, when the rent is overdue, and then the easily revised inventory would be of great assistance in making his claim. But there is no difficulty in making a claim, the point is to substantiate it; and I think the house agents who so boldly advertise their recommendations of inventories as being of assistance in making claims should amend their language if they wish to be considered frank and not misleading, by endeavouring to show the use of these valuations and inventories in supplying *proof of the existence of the goods at the time of fire and of their destruction by the fire.*

After all, gentlemen, millions of losses have been settled, in the main satisfactorily, with householders on the contents of their houses and the honest man has no need for a previously prepared list, prepared perhaps years ago, and, indeed, the carefully revised list up to date would in many cases suggest the suspicion which otherwise would never arise. The honest man has generally an honest way of expressing himself, and the lines of truth are, thank Heaven, written on a man's face, while its tones are in his voice and its evidence in his manner, and are much more conclusive than any valuer's inventory, however beautiful the penmanship and elegant the binding. An inventory may be useful to assist a man's memory in preparing his claim, but can never be accepted as proof of loss.

But the friend whose utterance I quoted in the earlier part of this paper had in his mind at the time the issue of valued policies to mercantile insurances. It seems to me that these, least of all, call for valued policies, for surely the chief ground of demand for them is the supposed difficulty of finding the worth of things destroyed, after their destruction, and in spite of all that has just been urged there is no doubt sometimes a little trouble but no real difficulty in doing this in regard to articles of household use,

as compared with commodities which are the subject of market dealings and prices daily published in every mart of the world. As you know, the principle of indemnity for loss actually sustained, which is the essence of fire insurance contracts, is safeguarded and liberalised in mercantile policies by the wording of the contract, which runs as follows:—"£——on merchandise, &c., in no case exceeding the market value of the goods immediately anterior to the fire." Obviously such a contract is equitable and easy of fulfilment, because there is no kind of merchandise which has not its market, and the prices of that market are published daily or almost daily. What, then, can be the necessity for agreeing a value to-day, which may not be the value, and the known and easily ascertainable value, beyond dispute, by authentic and impartial data at the time the fire occurs? One can but suspect the merchant who presses for such a policy is pretty certain he is insuring a commodity which is falling, and which is likely to continue to fall, in value, and therefore wishes to protect himself, not against the loss of the actual worth of the goods when the fire happens, but against the loss of the value he may have paid for them, or their value at the moment of insurance, known to him to be falling. In other words, he wants to insure what may not, and probably will not, be existing when the goods burn—or put it another way, he wants to insure against a loss, not by or in consequence of fire, but a loss likely to accrue to him from bad judgment, or rash speculation, or the chances of the market. Or still another way it may be put—he wants to insure against the loss of profit he expected to make but is pretty certain he will not make.

It is said there is no danger in this, at anyrate in cases where the goods are not in his warehouse or under his control or that of his servants, for instance where the goods are in public warehouses or perhaps in bond. Obviously there is not in such cases the same objection on the ground of moral hazard. If he becomes desirous of their destruction in order to realise from the companies the profit the market refuses him, yet he can be under no temptation to bring this about, because the devil never tempts a man to do the impossible. Granted this eliminates the element of possible arson and so far is to the good, there yet remains the objection that should fire occur he realises from the companies what does not exist, he gets from them a value which he had not at the time of fire, he makes a profit out of the fire. Surely it is

not desirable for companies knowingly to contribute to this possibility by granting contracts which thus introduce the element of gambling into a business designed only to indemnify actual loss. Were such policies to become common it would be impossible to limit them to goods in warehouses out of the insured's control. They would be issued generally quite apart from the location of the property insured, and thus would offer a constant temptation to arson. Is not this world of conflicting interests, complex conditions, and interlaced considerations, full enough of incentives to fraud and temptations to wrong-doing, without our honestly useful craft being demoralised and changed into an evil spirit going about seeking whom it may devour by the poison of insidious suggestion to arson for the purposes of Godless gain?

It is sometimes said, But what does it matter how much we pay so long as we have the premium for it? Oh! there's the rub; if we could get the premium for what we *pay* it would not matter to the companies, apart from morality. But our premiums are calculated, not on what we pay, but on the utmost we may have to pay for the satisfaction of actual value of property destroyed, and the moment you make the sum to be paid represent something other than value of property at the time of burning you introduce an unknown and incalculable element of risk that only a disastrous experience can teach the value of, and when taught is useless, because that value—the value of the risk—will constantly rise in proportion as the risk develops, and that risk will most surely develop as property, human ingenuity, human greed, and human population grow. Rates would require to be raised to a point that would make them unpayable, because every policy issued could be made to yield a profit in case of fire; it would thus become a direct incentive, and fires would multiply. There will be no end to it until the end of the companies comes in a general crash. Their successors will then rise Phœnix-like, founded upon the principles of soundness and safety abandoned by those who have come to grief. The only safe insurance of an agreed some of money is against risks which are beyond human control, or if within human control, only at the price of human life, as the penalty of murder.

A sum insured on a man's life, payable at his death, is a safe transaction, because in 999 cases out of a thousand he is worth more alive than dead to those belonging to him, and generally loves the society of himself, if not that of others, here below, more

than that of those who have gone before. Besides which, as he cannot take his money with him, and certainly not his insurance money, for we don't yet pay claims *before* death, he can hardly benefit himself by suicide and he seldom loves others sufficiently to desire to benefit them by hurting himself.

But now, gentlemen, there is another innovation, extension, or development evolved by the ingenuity of a few actuaries following the unscientific daring of Lloyd's. I mean profit policies—insurances against loss of profit. This, of course, is a more definite infringement of the principle of indemnity, because if you give a man something he never had, you can hardly be said to be recouping him the loss of that which he once possessed. It is far worse than the class of policies we have hitherto considered, because it cannot be said of them that they definitely undertake to pay for profits not earned, they merely *may* do so, and it is pretty certain they *will* do so in a great majority of cases. But even then the profit is of a different nature to the profits contemplated by profit policies. If a man by means of a valued policy gets £100 because that is the sum assured and agreed as the value, while the actual value is only £80, in a sense he makes a profit of £20, and if every policy was a deliberate intentional insurance of such an over-value it would be worse than the profit policies we are about to consider, because these refer to legitimate trade profits which have been earned, but which through fire can no longer be earned. The objections to them are several:—

(1). They are against public morals because they afford incentives to arson in cases of depreciated machinery, decreasing trade, and falling profits.

(2). They increase the fire risk by withdrawing from the insured a kind of co-insurance with his fire policy, and thus add to the waste of the world's wealth.

(3). They tend to reckless trading, which injures the community in general.

(4). They check the growth of business ingenuity, skill, and knowledge.

Does someone say—"Oh, this is all very fine, but a man may through fire suffer loss of profits in a maufacturing concern just as he loses the beneficial use of the premises the value of which is expressed in rent, or the beneficial use of capital the value of which is expressed by interest; surely these profit insurances can be defended?" Of course they can be; everything can be defended,

or where would the lawyers be? But the point is, can they be justified by public utility? Is their usefulness to A's pocket destroyed or counterbalanced by their harm to his morals? Do they tend to make the community richer? Are they calculated to mitigate loss or lessen misfortune without injuring society in general? To put it plainly, are they not likely to make rogues of honest men?

Fire insurance as a recoupment of loss by misfortune of fire, through spreading that loss over many persons instead of leaving it to be borne by one, is a sort of co-operative protection that savours of early Christianity when people had all things in common. The principle of sharing losses is quite as beneficent as that of sharing possessions. But when its application tends directly to the multiplication of losses, to make the losses borne not those of misfortune only but those of fraud, and to *encourage* the fraudulent losses, it is a question whether a highly civilised community should allow the principle to be embodied in commercial contracts.

If these policies merely tend to increase innocent losses, they are bad as being destructive of the world's wealth, and as inflicting loss on others in the shape of higher premiums.

If they tend to produce fraudulent losses they are worse, because in addition they become an encouragement to wrongdoers.

But are they as bad as all this? Let us look at them a little more closely.

The contract is to pay the insured a sum equal to the profits it may be presumed he would make during the time his factory or place of business is rendered unfit for occupation and use by a fire. The amount of this sum is to be ascertained by an examination of his books for the last preceding two or three years. What would take the place of this in cases where the insured had not been in business for that time I do not know. Possibly such a man or firm would be considered uninsurable. Reversing the test of acceptability which obtain in social life, it may be required by the careful underwriter that applicants for these policies must have a past—they must be firms or traders who can show they *have* made profits. So far so good, but incidentally it may be remarked that this will bring into existence a new class of accountants or auditors. It is wonderful what figures can be made to prove, and the manufacture of day books and ledgers and profit and loss accounts and balance sheets will soon become the

work of specialists. You know it is often said you can get any opinion you want from counsel if you only state your case properly. And so with profit statements and accountants; the same materials lend themselves to quite a variety of structures, whether those materials be figures or bricks and timber and tiles.

Then, again, we have heard of books being burned; it is generally a most convenient misfortune to the assured, while it hampers the assessors considerably. What will the owner of a profit policy do then, poor thing? Fall back upon his pass-book perhaps, which luckily may be at the bank. But we all know—at least I hope all of us know—what an extremely intelligible compilation this is. The entries are so self-explanatory; the term "cash," or the name of the town in which a draft is drawn, are so very illuminating as to the meaning of the entry on the payments-in side, while on the other side—the payments-out-side—the words "Smith, Jones & Robinson," &c., are perfectly dazzling in their self-evident significance. A friend of mine for years kept private accounts until his transactions became so numerous, owing to his growing prosperity, that he found it to irksome to continue a private cash book. He determined, therefore, to rely on his pass-book, and at the end of the year he commenced to analyse and classify his receipts and payments from this book, and he then found out that the nature of the transactions recorded by those beautifully-written and voluminous entries entirely defied discovery, even with the assistance of his memory. No, it won't do; the banker's pass-book, as I know it, will have to be remodelled before it can afford safe material for showing whether a man has been making profits or losses. How, then, will the dishonest claimant be bowled out when books are burnt? Does it not strike you, gentlemen, that this weakness will be quickly perceived, and that the number of cases in which books are destroyed will multiply appreciably?

Of course it is no concern of the companies who issue these policies that they will prejudice the chances of fire companies detecting fraudulent claims. Not only in respect of disappearance of books will this be so, but on a much more important point. At present an insured is, in a sense, a co-insurer with the fire company, in that over and above the actual loss of property by fire, there is the loss of interest on capital and profits of trading, against which hitherto he has been unable to get cover from

companies. This he has to bear himself. It is evident, therefore, that the knowledge of a loss which will fall upon himself is a great incentive to care, and when this is withdrawn there will be more fires, more waste of the world's wealth. For although a fire policy is an indemnity to the individual sufferer, it must not be forgotten that in the wider sense it is no indemnity at all, but merely a spreading of the loss over all the policy-holders of the company. At best, therefore, every fire is an evil, in that it leaves the world poorer; it is a destruction of property which cannot be made good except by replacement at the cost of the community. This being so, any system of insurance which directly fosters fires and fraud ceases to that extent to be an economic blessing and becomes a curse.

The knowledge of the existence of these profit policies in the safe of a trader further weakens his efforts to make his business a success. The thought will constantly occur when quoting a cut price, or launching out into a questionable purchase, or entering upon a contract of dubious result—What does it matter? I can have a fire and all my property is insured and my profits for six or twelve months after. Careless trading will follow as a matter of course, and the springs of ingenuity, resource, invention, economy will be relaxed and the *morale* of the individual lowered.

There are other modifications and developments which, if time permitted, I had in mind to touch upon, but I cannot do more than mention them now. They refer more especially to matters of administration and practice such as—

Ingenious forms of competition, which are often nothing but resorts to suppression of truth—and even misrepresentation and slander, couched very often in language which may be technically true, but which in spirit and intention is absolutely unjustifiable, and which degrades the Offices and the representatives who so insidiously use it.

The creation of local directorships and local boards, which are frequently such only in name, and which are as often nothing but crooked ways of adhering in form to obligations which it is found inconvenient to live up to, and which adds so considerably to the expense of our business at the cost of the public who insure.

The indiscriminate appointment of agents, which tends to rob the legitimate agents who have built up our business of their just reward, and breeds in the public mind a sense of unfair

rates, besides giving ground for suspicion of wholesale corruption and illicit payments by these so-called agents who do very often none of the real work of the true agent.

But these must be left for another occasion.

Gentlemen, I do not pretend to have placed before you anything that was not known or had not been thought of by those who have spent some years in the practice of fire insurance. But I recognise that this Society has many members drawn from the ranks of the juniors of our staff, who are, comparatively, novices in the business. The new generation is not born with the results of the experience of past generations in their blood—the knowledge of their forefathers does not come to them automatically with the cutting of their teeth. Ever and again have first principles to be emphasised and declared in all departments of business and life. In none is it more necessary than in insurance, which, as a method of alleviation of suffering and mitigation of loss, is constantly in danger of being led off the track of sound progress, owing to the growing complexity of business requirements and the maddening craze for gain without labour. The only safe *subject* of insurance is an actual tangible possession, the destruction and value of which can be clearly demonstrated. The only wholesome *application* of insurance is that which confers benefits without demoralising those who receive them. The only worthy *practice* of it is that which is free from dissimulation and trickery, and which only men of absolute integrity can carry out.

Gentlemen, we have a high calling, a valuable heritage, and functions as dignified and useful as fall to the lot of any engaged in commercial life. Let us "press forward to the mark of the prize of our high calling," which is personal rectitude securing public confidence; let us jealously guard the principles of this great business which have been so lucidly and firmly established, and handed down to us, in the main, by clean hands and cautious minds; let us perform our duties and administer the blessings of indemnity and recoupment with a consciousness that our trade is not an unworthy one, and that the only vulgarity attaching to it is that which comes from dubious practices and misleading representations.

THE ETHICS OF EFFICIENCY.

By JOHN LOUDON.

A Paper read before the Insurance Institute, Manchester, 19th October, 1906.

I AM very glad to have this opportunity of meeting with you, and inviting your opinions and suggestions in regard to the advancement of interests which many of us have deeply at heart, namely, the Educational work of our Institute; and I take it that our presence at this meeting is a visible sign of our recognition of the responsibilities which, in varying character and degree, devolve upon us in the discharge of duty.

The philosopher has said that "the greatest trust between man and man is the trust of giving counsel." Little reflection is required to perceive how cogent is the truism, but, like all sound standards of service, it has its constraints, and none more so than the obligation which it entails of personal consistency. I am, therefore, gentlemen, very sensible that, in submitting to you some thoughts—appropriate, I hope, to the inaugural meeting of the Educational work of this session—I lay upon myself claims at least co-equal with the convictions I shall express.

A late distinguished statesman said that "only under the discipline administered by a vigorous criticism, directed to canvassing our characters and our aims, are we really capable of great elevation or of high performance." Influenced by the feeling and spirit which embrace this view of individual obligation, I venture to ask your consideration of the Ethical Aspects of Efficiency.

Efficiency may be defined as the condition in which our service (I use the term in the broadest sense as applicable to all positions) is competent to produce the best result for which it exists. We are, therefore, efficient in the proportion in which we realise

the functions with which we are entrusted, and discharge these functions in the highest measure compatible with our opportunities and abilities. In other words, efficiency, in the sphere in which we find ourselves placed, is evinced by the degree in which the institutions we serve stand to gain or lose through the services we render. My purpose in thus addressing you is to consider mainly some principles of action with the object of stimulating professional efficiency, rather than to review methods of work by which such efficiency is usually determined. To thus subordinate methods to principles we make a proper distinction. Principles are primary, while methods are secondary. Principles are permanent. Methods must be determined by local and changing conditions.

Apart from the interdependent relationship of principle and method, each claims close and careful study; but it is to the former alone, the governing power of efficiency—its ethical aspect—to which I invite your attention, as possessing an immediate value and interest.

The easy-going optimism which professes to find cause for contentment with the present, and for hopefulness in the future, without carefully studying the signs of our times, must be resisted and rejected, for educational activities, academic and commercial, are dominating all thinking minds to greater aims and higher standards.

Rousseau has said, "Much philosophy is wanted for the correct observation of things which are before our eyes." Our daily routine of all-absorbing duty and strenuous effort so familiarise us with the environment in which we are placed that there is a tendency for our outlook to become circumscribed, and consequently we are apt to undervalue the striking and resistless forces which are creating and moulding thought and action around us. "As a man thinketh, so is he." "As the worker is, so is the work." The sphere of life to which we are devoting our days, the business life in which our anxieties and hopes are centred, is one in which the range of duty is complex, exacting, and onerous; and to efficiently perform the functions with which we are entrusted, the measure of our mental equipment should be the measure of capacity demanded by the functions we discharge.

The institutions we serve obtain and maintain their place and rank because they collect, arrange, and reason upon a particular order of circumstances. The objects for which they exist have

important practical ends, and the quality of our capacity in serving that purpose is more or less valuable, according as these practical ends may be gauged in anticipation, with increasing confidence and accuracy.

Art deliberates upon some aim, having as its objective an important practical end, and in the attainment of that end art points the path towards achievement. In its primary operation, art seeks to know the conditions underlying the purpose in view; then taking these conditions separately, it respectively applies the science by the agency of which these conditions may be illuminated and shown in true perspective. Gathering the adjustments together, art reasons that such and such factors will produce such and such results, leading up to, or near to, the end desired: the all-embracing virtue being that the deeper our insight and more accurate our application of the resources of art, the greater the good and the lesser the evil possible.

And now, gentlemen, knowing as we all do the widely diversified elements which determine risk and constitute the business of underwriting in any of its departments, do we unduly magnify our vocation when we rank it as an art? I think not, when we consider the range of inquiry and scientific application necessary in collecting, arranging and reasoning upon the facts which underlie the appraisement of risk. But, whilst science may adjust in true proportions elements of risk, and art may determine the standard evolved, their place in efficiency is secondary to those ethical considerations which as principles—and being primary—dominate, control, and in greater or lesser degree yield quality of value to methods and conclusions, the superiority of which are gauged by the measure of good as a practical end accomplished. And this brings me to the fundamental factor in the problem of efficiency, namely, personality, for personality involves principles, and principles being primary are the ethics of efficiency. "As a man thinketh, so is he." "As the worker is, so is the work."

Our principles stand for ourselves. As "the will selects and appropriates to itself and exerts its influence upon the various materials supplied by reason and desire," so is there evolved some degree of efficient personality, and the measure of efficient personality is the measure of individual capacity for effective service. Efficiency is consequently self-formed, and "as the worker is, so is the work." Therefore, efficient personality, or individual capacity, is found to depend upon our principles.

This leads us to consider our aspirations, in other words, the conception we place upon our sphere of life and duty. That to which we aspire, to that we strive to attain, and our every effort is a step forward and upward. Failures may beset our efforts, but failures, rightly received and dealt with, are not infrequently the soundest stepping-stones to efficiency.

Three outstanding principles may be selected as governing with primary importance the true conception of responsibility, of which, as I said in my opening observation, our presence here this evening is a visible acknowledgment or admission. The first outstanding principle appears to me to be honesty. It is a virtue, the breadth and depth of which is unfathomable in its significance and consequence. The adage "Honesty is the best policy" is degrading. Honesty is not a policy, but a principle. To be true to oneself implies the highest standard in the discharge of duty of which we are capable, or in other words, the upright and fullest use of the faculties and powers with which we are endowed, and which among other inestimable qualities make for efficiency.

I conceive the second outstanding principle to be faithfulness. Faithfulness implies patience with continuity of purpose, a virtue so eminent that, without its scrupulous preservation we must despair of reaching the goal of efficiency.

For the third outstanding principle I select energy, a virtue so monumental in its achievements that, even where honesty and continuity of purpose have been faulty, effective service may be rendered, although lacking in true perspective, for, "as the worker is, so is the work," and the measure of efficiency being the measure of individual capacity, "as a man thinketh, so is he."

Inherent capabilities are a barren dower apart from the honest, faithful, and energetic recognition of vocation or duty. These three qualities of honesty, faithfulness, and energy are the essential forces of which adequate account must be taken; and therefore as an ethical proposition it is clear that, whatever our methods may be, the highest result to ourselves, and in the duties we discharge, can only be gained through the possession of principles which inherently establish conditions of highest efficiency.

Now let us consider the *rights* of the environment in which we find ourselves placed, namely, the rights of the institutions we serve. These institutions exist to attain an object which is

commercial. In effect we form part of financial organisations more or less complex in the acquisition and adjustment of risk, the appraisement and selection of which, to secure commercial or trading advantage, necessitates expert co-operation. By reason of the end, or effect desirable, namely, the realisation of profit, appraisement must be a primary operation. Of the appraisement, or estimate of risk, as we term such operations, the earliest are immediate. They are resultants of judgment which form constituents in the probabilities of financial gain, constituents intellectually seen simultaneously with examination of material agencies, in other words, the *cause* upon which the effect depends. Such appraisement, or intellectual perception of probabilities, involves rejection of contingencies, or, their acceptance and subsequent adjustment under further operations of classification, experience and principles of average. But, other unascertained contingencies are subsequently not infrequently evolved, which have not been seen, but of which superior appraisement, or higher efficiency, might or could have *foreseen* in the original judgment formed.

It is thus evident that measure of efficiency in appraising the *seen* and *unseen* is vital to ultimate consequencies, namely, the realisation of profit, or contraction of loss.

And so we return to our former observation, that, the financial advantage we exist to secure, necessitates expert co-operation. To quote from our highest authority in ethical propositions, "there are diversities of gifts," "there are diversities of administration," "and there are diversities of operations"; and the domestic discipline of our institutions involves a complex organisation, the administrations and operations of which are augmented, or stultified, in proportion to the efficiency of service rendered by each contributing unit. The measure of all the units is the aggregate value of their individual worth, and the higher the standard of each unit, the more efficient the co-operation of which our institutions, in place and power, are the embodiment.

On all sides the stern test of utility is being applied, and in all spheres of life and work the things which can be shaken are being removed, and in our own sphere in the world's economy, we must see to it that we fail not in that personality of character through which alone efficiency can be secured, as our reasonable service to the institutions with which we are associated.

A British statesman observed quite recently that it is not sufficient to think imperially, but also to think internationally, and this opinion is applicable with much force to the vast activities, complexities, and responsibilities associated with the administration and operations of British underwriting in all departments. The world does not under-rate the value of our institutions, but we must never forget that we ever stand at the bar of public opinion, to be judged by security of indemnity and of investment; and the measure of efficiency with which our institutions are able to justify the end for which they exist, is the standard of co-ordination and co-operation in efficiency, namely, the aggregate of personal character and individual capacity.

The Educational work of the Insurance Institutes, Societies, and Associations, of which we are proud to know Manchester has been the pioneer at home and abroad in that Empire on which the sun never sets, has exercised so great and abiding an influence that there are not wanting signs, in spheres of education and culture, that our ideals are identified with sound standards and efficient results.

Problems, inseparably connected with associated professional procedure, essentially private in its character and administration, have to be solved; but it is matter for unaffected satisfaction that our Educational work has merited hearty invitations from centres of Academic and Technologic status, with the object, in some degree, of affiliation by which to extend their spheres of usefulness. Our more immediate Universities of Manchester, Liverpool, and Birmingham are awake to the vast power they can exercise towards efficiency in commercial life, and our great local School of Technology, with its magnificent equipment and kindred aim, testify to the opportunities for, and necessity of, higher standards and greater efficiency. Commerce is asserting the *right* of efficiency, and if that be established, the *duty*, logically and legitimately, follows. Apart from the virtues of Academic study, the trend of the commercial life of to-day in its complex industries, teeming with the applied sciences, is demanding higher attainments, specialised qualification; in other words, expert efficiency. Our Universities are finding their alumni in every sphere of the world's activities, and if from the inner consciousness of that "philosophy" which "is wanted for the correct observation of things which are before our eyes" we ally ourselves with those great forces which make for efficiency, not only will our status in the great economy

of beneficent enterprise be loftier, but our own horizon will be broader through the assertion of principle, the removal of obscurities, and a realised efficiency.

A full and instructive commentary upon the prescience of colleagues—some of whom are with us this evening—is to be seen in the achievements of to-day. Their recognition of the fundamental subtleties of our business by providing opportunities for collective study, initiated unostentatiously many years ago, is crystallised in our present-day measure of educational activities. If we look afield, what do we find? Our country, in its great centres, also our Colonies and Dependencies and Foreign States, possessing institutes, societies, and associations for the study of kindred subjects, and all adding their quota of thought, expression, and experience, upon many complex and difficult considerations interwoven with our business. To think clearly, to act wisely, and to deal radically with the subtleties of our profession is in reality not one but many problems with which we are constantly faced, the economic solution of which is, in greater or lesser degree, measured by our co-ordination and efficiency; for in large degree our collective interests are international and interdependent, as the exigencies of business increasingly establish.

And when we more closely survey the status and influence to which the Conferences of our Federation of Institutes and published Contributions have attained, and view the impulse of to-day which may portend—through Incorporation or Royal Charter—a closer union in definite aim, code of qualifications and standards of efficiency, we realise that the day of elementary effort and of division is passing, and that we are on the threshold of domiciled distinctions which will determine, perhaps slowly, but none the less surely, the standard of efficiency necessary to qualify for professional service and promotion. If this attempt at diagnosis be correct, something more than administrative expediency will assert itself in professional equipment. With diversities of gifts, administrations, and operations, there will differentiate with duty efficient personality—individual capacity. The casual and the uncertain will be conspicuous by their absence, and just as the character of life, physically, mentally, and morally, is affected by the sources from which it draws support, so will the potentialities of our profession be revealed in truer proportions under a curriculum of certified efficiency.

Surely such conclusions are not too robust for representative institutions of national importance.

There is, however, an aspect of our subject which cannot be overlooked, an aspect which carries with it a paralysing and poverty-stricken pessimism. There are not awanting those who, not content with divesting themselves of principles which make for efficiency, disparage the views and endeavours of those who would. Deficient in mental vision they see not beyond to-day. Short-sightedness synchronising with limited capacity, their responsibilities are lightly accepted, their duties are inadequately discharged, and their influence is subversive of legitimate aspirations and sound resolutions.

"What's the good?" How often has not this miserable apology for lack of principle been uttered amongst us! Unfortunately, too frequently has it had its influence. "What's the good?" Much. It is to be found in the survival of the fittest, in the appraisement and selection of personal efficiency, which is natural and just because of order and sequence.

It is to be feared that we are not without a residuum which disturbs where there might be unity of conception and purpose, but relentless is the stern logic that, as cause precedes effect, and principles are primary to methods, so shall personal efficiency—individual capacity—fix our real value as factors in the serious business of life. We cannot expect to gather "grapes of thorns" or "figs of thistles." "As a man thinketh, so is he." "As the work is, so is the worker." "As the worker is, so is the work."

THE FEDERATION OF INSURANCE INSTITUTES OF GREAT BRITAIN AND IRELAND.

EXAMINATION PAPERS—1906.

FIRE BRANCH.

PART I., SUBJECT A.—POLICY DRAFTING AND ENDORSEMENTS.

(POTTERIES.)

(*Two hours allowed for this Paper.*)

The use of the Tariff is permitted. Printed Warranties and Scale of Allowances must be used. The Warranties and Scale of Allowances need not be attached to the Draft, it being sufficient if the date of the issue used be referred to.

MESSRS. GREEN & CO., OF THE MIDLAND POTTERIES, STOKE-ON-TRENT, STAFFORDSHIRE, Earthenware, Stoneware, China, Porcelain and Majolica Manufacturers.

Letter on Plan.

A One floor.—Brick or stone-built and slated or tiled. Clay store and grinding room (containing 1 pug mill, 2 colour-grinding mills, 1 mixing machine, 1 straining machine and 1 glaze pan) and moulding and drying room (containing 2 stoves with 4 ft. of pipe to each, 3 wheels and 2 lathes).

B One floor.—Brick or stone-built and slated or tiled. Engine and boiler house, containing a 16 h.p. horizontal steam engine and a Galloway boiler. Communicating with A by single armoured door.

C One floor.—Brick or stone-built and slated or tiled. Kiln house containing a circular kiln with timber in contact therewith. Communicating with A.

D Two floors.—Brick and timber-built and tiled. *Ground:* Store for glaze, colour and stock, dipping-room and drying-room (heated by hot air flue). *First:* Artists' room and store for stock; printing on ware done; containing a pipe stove with 2 ft. 6 in. of pipe.

Separated from C by single iron door.

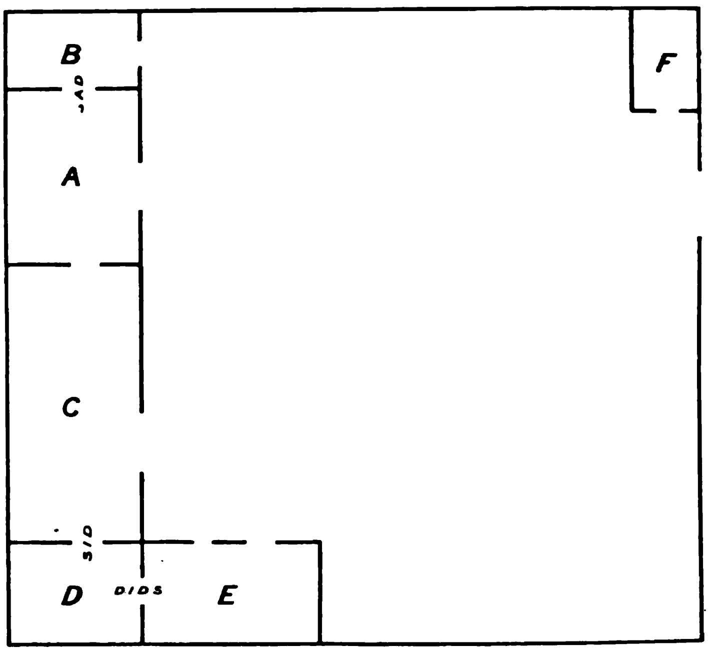
Letter on Plan.

E Two floors.—Brick and timber-built and tiled. Packing-room and stable with loft over for hay and straw, the latter being used for packing. Adjoining and communicating with D by double iron doors.

F Two floors.—Brick or stone-built and slated or tiled. Offices, containing 2 pipe stoves with 4 ft. of pipe to each. 22 ft. from all other buildings.

MESSRS. GREEN & CO., OF THE MIDLAND POTTERIES,

STOKE-ON-TRENT, STAFFORDSHIRE.



All in sole tenure of insured and situate as aforesaid. Lighted by mineral oil lamps and heated only as stated. No packing material deposited or packing done except in E and no petroleum or other mineral oil or liquid product thereof or creosote or naphtha used in or during the process of manufacture. No woodwork in contact with any heated air flue or pipe stove flue or within 2 ft. of any stove.

Fire appliances:—Two fire-plugs in yard and buckets to scale in A, C, D and E.

Insurances in other offices allowed, the amounts to be declared in the event of loss.

From 29th September, 1905, to 29th September, 1906.

	A & C	B	D	E	F
Building	1,500	150	750	200	250
Millwrights' Work, &c.	1,000	—	—	—	—
Engines, &c.	—	750	—	—	—
Patterns, &c.	250	—	250	—	—
Stock, &c.	1,000	—	1,500	250	—
Office Furniture, &c....	—	—	—	—	150
Horses, &c.	—	—	—	300	—
	£3,750	£900	£2,500	£750	£400

Total .. £8,300

Draft a policy showing rates, with analysis, and calculate the annual premium.

ENDORSEMENT.

On the 25th March, 1906, notice is received that the upper floor of F is to be used as a store for stock and a sum of £250 is to be transferred from item covering stock in D to cover said stock in F.

Draft the necessary endorsement to give effect to the above.

FIRE BRANCH.

Part I., Subject A.—POLICY DRAFTING AND ENDORSEMENTS.—WOOLLEN MILLS.

(*Two hours allowed for this Paper.*)

The use of the Tariff is permitted. Printed Warranties and scale of Allowances need not be attached to the Draft, it being sufficient if the date of the issue used be referred to.

Draft a policy from the aftermentioned particulars and calculate the annual premium:

Description from Surveyor's Report.

"NELSON MILLS," situate Centenary Street, Leeds. Owners and Sole Occupiers, Messrs. A. & B. Smith.

1. Four storeys and attic.

First: Fireproof, having external entrance only, and divided into three compartments communicating openly with each other—(*a*) garnetting waste, (*b*)

raw material store and for willeying, (*c*) scouring, milling, fulling, raising, brushing, cropping, and teazle setting.

Second and third (ordinary construction): Scribbling, carding, and condensing.

Fourth (ordinary construction): Hand-warping, pattern hand-loom weaving (two looms), and store for weft and reeds.

Attic: Mule-spinning.

Wood stairs through each floor from second to attic. Lighted by incandescent electric light only.

2. Shed on raised ground, the floor being level with that of the second of No. 1, and communicating therewith by double fireproof doors; winding, warping, warp-dressing, beaming, and power-loom weaving, three Jacquard looms for pattern weaving—the remainder all plain looms—using cotton warps. Lighted by incandescent electric light only.
3. Steam engine-house, equal to two storeys, adjoining No. 1, but communicating therewith only by an opening of sufficient size to admit the shaft. Contains, besides the engine, a dynamo and the main switches for the electric light.
4. Two storeys. Boiler house (no drying) adjoining No. 3, with which it communicates only by double fireproof doors, and being 14 ft. distant from 1 and 2. Drying of woollen material not free from cotton done in compartment over the boiler and separated therefrom by perforated iron floor.
5. Three storeys, detached.

First: Part as office, containing a slow-combustion stove standing in iron tray on stone flag. The stove is 26 in. and the pipe (6 ft. in length venting into brick flue) belonging thereto is 12 in. from woodwork or other combustible material. Remainder as press shop, the press plates heated only by steam.

Second: Piece warehouse.

Third: Burling and mending.

Cubical contents 245,000 ft. Wood stairs to all floors and brick hoist but without iron door to each opening.

MATERIALS.—Wool, noils, laps, worsted thread waste, mungo and shoddy (containing cotton). The materials used are scoured before passing through the mill processes. Added cotton, 45 per cent.

OILS.—Manufactured cloth oil containing 9 per cent. of unsaponifiable matter and having a flash point 350° Fahrenheit.

EXTINGUISHING APPLIANCES.—Buckets to scale.

RATES.

No. 1. *First:* Normal 31/6, materials 10/-, cotton 7/6 = 49/-.
Upper Storeys: Normal 10/-, height 1/-, materials 10/-, cotton 7/6, willey 4/-, openings 1/- = 33/6.
No. 2. Normal 4/-, Jacquards 1/-, cotton warps 1/- = 6/-.
No. 3. 5/-.
No. 4. 75/-.
No. 5. Normal 2/6, openings 1/-, stove 6d. = 4/-.
Discount 5% for Extinguishing Appliances.

DIVISION OF AMOUNTS.

	£
MILL—*Three upper storeys and attic*—	
Building	4,000
Machinery, shafting, gearing, electric installation	3,500
Designs, patterns, and utensils	700
Water, gas, and steam pipes	400
Stock-in-trade	2,000
Contents, other than above	150
MILL—*Fireproof first storey*—	
Building and pipes	1,000
Machinery and shafting	1,000
Stock	100
WEAVING SHED—	
Building	1,150
Machinery, patterns, electric installation	2,000
Water, gas, and steam pipes	100
Stock in process or manufactured	1,265
ENGINE-HOUSE—	
Building	550
Engine	2,000
Dynamo and Electrical installation	250
BOILER-HOUSE—	
Building	500
Perforated iron floor	75
Boilers and economisers	600
WAREHOUSE AND OFFICE—	
Building	1,100
Office fixtures, furniture and safes	500
Press plates and utensils	100
Stock	2,000

FIRE BRANCH.

PART I., SUBJECT B.—RE-INSURANCES.

(One-and-a-half hours allowed for this Paper.)

QUESTIONS.

		Marks.
1.	What information is necessary to be given to a guaranteeing office by an insuring office desiring a guarantee?	15
2.	How is the request for a guarantee to be made and, in the absence of any intimation to the contrary, what relation should the sum stated thereon bear to the sum insured?	15
3.	Following acceptance, what information has to be supplied by the insuring office to the guaranteeing office, and within what period; and in default of such information what is the position of the latter to the former? ..	20
4.	In the event of inability on the part of the insuring office to supply copy of policy to the guaranteeing office within the stipulated time, what procedure is necessary to obtain continuance of the guarantee?	20
5.	(*a*) In the event of unconditional acceptance by a branch official or agent, what period must elapse before it becomes absolute; and (*b*) during such period does the acceptance confer protection?	15
6.	Does an error or omission in describing the risk invalidate a guarantee; and if not, in what manner is the guarantee to apply?..	20
7.	In the event of a guaranteeing office having been misled by any error or omission in the information required by Rule 1, to what tribunal shall such matter be referred and what are its powers?	20
8.	What constitutes valid notices in connection with guarantees?	15
9.	In what form shall a guarantee be issued, and how shall such be executed?	15
10.	What information is respectively required to be furnished at each renewal quarter by the guaranteeing office to the insuring office and by the insuring office to the guaranteeing office?	15
11.	What length of notice is required to be given by the guaranteeing office to the insuring office of intention not to continue a guarantee following an annual insurance?	15
12.	What limit of time is allowed to an insuring office within which to give notice to the guaranteeing office of the renewal of a short term insurance?	15

FIRE BRANCH.

PART I., SUBJECT C. — GENERAL RULES FOR THE REGULATION OF FIRE INSURANCE BUSINESS.

(*Two hours allowed for this Paper.*)

QUESTIONS.

		Marks.
1.	What is the nature of the work for which architect's fees may be admitted under a claim?	5
2.	What are the rates of discount which may be allowed on long term insurances?	20
3.	The late Act 9, George IV., Cap. 13, provides that average be applied in all cases where plurality of risk is occasioned, with certain exceptions. What are the exceptions?	5
4.	(*a*) To what premises beyond those specifically mentioned in the policy may an insurance on household goods in a private house be extended? (*b*) Under what circumstances may an extension beyond above be granted?	30
5.	Under what circumstances is it not permissible to issue or renew a policy beyond 12 calendar months after the next ensuing quarter-day?	10
6.	What apertures may be allowed without extra charge in an otherwise perfect party wall separating two buildings?	20
7.	What are the conditions under which returns of premium in the following cases may be allowed?— (*a*) A tariff-rated manufacturing risk becoming silent. (*b*) A new policy being issued for a smaller amount in cancelment of an existing policy before its full term has expired	20
8.	What are the conditions under which additional rates uuder the following heads are chargeable?— (*a*) Stoves. (*b*) Lighting. (*c*) Spirits for cleaning purposes	30
9.	What are the warranties required to be inserted in all policies in all cases in which the insured can be held responsible?	20
10.	What is required of an office before the adoption of a specification for a tariff-rated risk and/or endorsement in connection therewith and before the issue of policy?	25
11.	What may be regarded as equivalent to two or more fire-plugs or hydrants in a yard in the case of risks having no yard?..	5

Marks.

12. What is the meaning of the expression "fireproof compartment" where there is a tariff provision relating to buildings communicating only across such a compartment? 10

FIRE BRANCH.

PART II., SUBJECT A.—KNOWLEDGE OF TARIFFS (Furniture Stores—England, Wales, and Ireland).

(One-and-a-half hours allowed for this Paper.)

QUESTIONS.

1. Under what circumstances may goods in a non-fireproof building be rated differently from furniture stored at a rental in the building? 30
2. When is the extra rate for "heating" not to be charged? 15
3. How would the following be rated?—A furniture store, brick and part timber-built, part one and part three storeys in height, part used as stabling by insured, who also has an upholsterer's shop in the building but only five hands employed in the upholstery business .. 15
4. In what instances can the Normal Rate be reduced, and by how much? 25
5. What would be the difference in rating furniture stored at a rental in the following instances?—
   (*a*) In an ordinary non-fireproof building conforming to all the tariff requirements, except those as to heating and lighting.
   (*b*) In a standard fire-resisting building conforming to all the tariff requirements.
   (*c*) In a modern fireproof building conforming to all the requirements of this tariff but having a stone staircase enclosed in brickwork between the floors with a wooden door opening on to each landing 30
6. In what other respect, if any, would the insurance on furniture stored at a rental in (*a*), (*b*), and (*c*) aforesaid differ? 20
7. How would the following be rated? A furniture warehouse, brick-built and slated, cubical contents 130,000 cubic feet, three benches for furniture repairing, heated by hot air flues from furnace outside the building 15
8. There are two specially-rated stores, A at 7s. 6d. and B at 5s., both belonging to the same firm and forming part of the same depository. How would you rate

Marks.

the following property (the policies being effected by a customer) in either of them floating, and what conditions would you attach?—

(*a*) Furniture.
(*b*) Silver Plate 25

9. A. holds a policy for £5000 on his pictures in his dwelling-house at an annual premium of £11 5s., due Christmas. At Midsummer he deposits £1000 of his pictures with B. Co., whose warehouse is rated specially at 6s. per cent. What is the amount of extra premium exigible up to Christmas in consequence? 25

FIRE BRANCH.

Part II, Subject A.—KNOWLEDGE OF TARIFFS.

(Potteries.)

(*Two hours allowed for this Paper.*)

Questions.

1. This tariff is divided into sections. Define as briefly as possible each section 25
2. To which items of the specification does average apply, and which average clause? 15
3. Describe the rule which controls the rating of buildings upon pottery premises which are not otherwise rateable under the tariff 20
4. Give the Normal rate under section I and the additional rates for the following:—

    (*a*) Defective Construction.
    (*b*) Height.
    (*c*) Pipe Stoves.
    (*d*) Lighting.

    What limitations are attached to these under the tariff? 25
5. Give the additional charges and conditions attaching under the tariff to the various methods of drying in a pottery 30
6. Where packing is done inside the pottery proper, or in a building less than —— feet distant, describe the various conditions and the rates attaching thereto, and supply the above blank.. 25
7. Where the packing-house is outside the prescribed area, give the Normal rate and the extras which may be chargeable 15

Marks.

8. Give the Normal and extra rates for glass works and flint-grinding mills respectively 20
9. State briefly the items under which the specification should be divided, giving any limits or conditions attaching thereto 25

FIRE BRANCH.

PART II., SUBJECT A.—KNOWLEDGE OF TARIFFS: WOOLLEN MILLS.

(*Two hours allowed for this Paper.*)

QUESTIONS.

1. What do you understand to be the preamble of a tariff and what is its object? 10
2. What do you understand by the term "white" as applied to mills and sheds, and would the term include any material that is not white? If so, name the material 10
3. What is the additional rate for coloured stripings in a white mill, and under which section of the tariff is it prescribed? 10
4. What is the definition of a fireproof mill? 10
5. Give the tariff definition of a shed 10
6. What are the normal rates under this tariff for—
   (*a*) A non-fireproof mill in England occupied for the necessary processes in the production of carpet yarns from pure undyed wool only? 5
   (*b*) A mill in Scotland occupied for the same purpose and using the same material? 5
   (*c*) A mill in England occupied for the same purpose but using materials other than, or in addition to, pure undyed wool? 5
   (*d*) A mill in Scotland occupied for the same purpose but using materials other than, or in addition to, pure undyed wool? 5
   (*e*) A worsted mill in Scotland? 5
   (*f*) A non fireproof flannel mill in Wales? .. 5
7. Give the rate, and how arrived at, for each floor of a fireproof mill, in single tenure (except as otherwise described). Mixtures of wool, unscoured mungo and shoddy (free from vegetabe fibre) and under 25 per cent. of cotton in any one blend are used; the material is dressed with manufactured oil containing not more than 50 per cent. of unsaponifiable matter and rugs and coloured blankets are produced.

Marks.

First storey is divided into three compartments as follows:—

(*a*) Wool burring, having no communication with (*b*) or (*c*) 5

(*b*) Scribbling and carding, having a timber partition to (*c*) 5

(*c*) Cloth fulling and milling by a separate tenant, who also works his machinery during the night 5

Second storey, scribbling and carding 5

Third storey, mule spinning 5

Fourth storey, weaving, using cotton warps .. 5

Fifth storey, winding, warping and warp dressing: Cotton warps used.. 5

Sixth storey (non-fireproof roof), cloth finishing .. 5

8. What are the additional rates applicable to a boiler house in which no drying is done? 10
9. What is the minimum rate for the drying of raw cotton by steam heat under the Drying Rooms Section of the tariff? 10
10. Mention three warranties, the inclusion of which in every policy issued under this tariff is obligatory .. 15
11. What would be the extra charges for night work for one month in (*a*) a weaving shed rateable under Section VII, and (*b*) a carding mill rateable under Section I? 15
12. What are the Normal rates for buildings used for—

(*a*) Burring or moiting of wool? 5

(*b*) Garnetting of Insured's own waste, free from cotton or other vegetable fibre? 5

(*c*) Garnetting of Insured's own waste, containing cotton or other vegetable fibre? 5

(*d*) Garnetting of bought waste, containing cotton or other vegetable fibre? 5

(*e*) Garnetting of bought waste, free from cotton or other vegetable fibre? 5

(*f*) Rag grinding: (*a*) if of more than one storey, (*b*) a shed? 5

FIRE BRANCH.

Part II., Subject B.—MANUFACTURES.

(Woollen.)

(*Two hours allowed for this Paper.*)

Questions.

1. Describe the mechanical structure of a woollen fibre .. 12
2. Give a brief description of the following materials:— Noils, mungo, shoddy, extract wool 20

Marks.

3. Name two processes or methods of removing "burrs" from fleece wool 12
4. Name in proper sequence the processes by machinery which take place after the material has been blended until it is converted into yarn 12
5. What is the chief difference between a scribbler and a garnett machine? What material is treated on the latter? 12
6. Describe briefly three of the following processes and their objects :—Rag grinding, willeying, carding, spinning, warping 30
7. What is the chief difference between the mule spinning frames used in a woollen mill and those in a cotton mill? 12
8. Mention some operations which take place after the cloth has been woven 12
9. Give a brief description of the process by which oil is recovered from the liquor in which woollen pieces have been scoured 15
10. What is a teazle? Describe it, and say what it is used for 10
11. Explain the terms—Yelk, sliver, yarn, weft, warp, nap 18
12. What do you consider to be the chief features of fire risk in connection with the woollen mill processes .. 20
13. Mention any classes of woollen manufacture which occur to you as being of a specially hazardous character .. 15

FIRE BRANCH.

PART II., SUBJECT B.—MANUFACTURES.

(POTTERY.)

(Two hours allowed for this Paper.)

QUESTIONS.

1. In regard to preliminary processes, describe the preliminary process of manufacture of earthenware prior to the clay being placed in the hands of the potter, describing particularly the following, viz.:—
   (*a*) Mention the raw materials used in the composition of earthenware 5
   (*b*) Describe the flint mill and the process therein carried on 10
   (*c*) Describe the slip house and the process therein carried on 10
   (*d*) Describe the mixers and the process therein carried on 10

Marks.

(*e*) Describe the clay pressers and the process therein carried on 5

2. Describe the work performed by the following workmen :—
   (*a*) The thrower 15
   (*b*) The turner 10
   (*c*) The mould and model maker 15
   (*d*) The presser (flat and hollow ware) 10
   (*e*) The saggar maker 10
3. Describe the methods of heating and drying as represented by :—
   (*a*) The ovens 15
   (*b*) What is the difference between biscuit and glost ovens 5
   (*c*) Enamel kilns 10
   (*d*) Fire-heated drying stoves and steam-heated drying stoves as used in the workshops .. 10
4. Describe the finishing processes, viz. :—
   (*a*) Dipping 10
   (*b*) Printing 10
   (*c*) Decorating and gilding 10
5. What do you understand by the term "glaze"? Describe its composition and mode of preparation 15
6. Describe the packing house and method of packing and despatching the ware 15

FIRE BRANCH.

PART II., SUBJECT C.—BUILDING CONSTRUCTION.
(INCLUDING HEATING AND LIGHTING.)

(*Two hours allowed for this Paper.*)

QUESTIONS.

1. Explain the meaning of the following terms in connection with brickwork :—Bond, header, stretcher, corbel, wood plug 15
2. Define briefly ordinary English brick bond, and draw elevation and section of four courses of 2½ brick wall in this style of brickwork (not necessarily to scale) .. 20
3. Explain the meaning of the following terms in connection with stone-work :—Rubble, ashlar, string course, cornice, cope 20
4. Explain to which parts of a window (of ordinary construction) the following terms apply :—Frame, sash, sill, soffit 15

Marks

5. Explain the meaning of the following terms in connection with roof building:—Span, pitch, rafter, ridge-board, eaves, wall plate 20
6. Describe shortly the method usually adopted to avoid running joists under a hearth or into walls in close proximity to flues, and draw plan of a fireplace with flue on each side showing arrangement of trimmed joists, trimmer, and trimming joists. Indicate on each of these members the name applying thereto 25
7. State fully the requirements under the Rules of the Fire Offices' Committee:—
   (*a*) For an installation of acetylene gas generating plant holding a charge of over 2 lbs. of carbide.
   (*b*) With regard to gas lights exceeding 175 candle-power 20
8. Describe fully the construction of a "fireproof compartment" used as a means of communication between two buildings as required under the Rules of the Fire Offices' Committee 10
9. State what constitutes a perfect party wall 10
10. A building of three storeys has external walls of brick, stonework, and corrugated iron; the floors are of concrete, with wooden flooring laid thereon, the windows are partly louvre-boarded and partly glazed in wooden frames, doors wooden; the floors are unperforated except by a hoist of iron construction having an ordinary wooden door to each opening; there is also a stone staircase giving access to all the floors, each opening therefrom fitted with a wooden door. State in what respects the building is disqualified under the requirements of the Fire Offices' Committee for fireproof construction, and what alterations require to be effected in order that the building conform thereto 25
11. What are the dangers connected with heating by high-pressure hot-water apparatus and what precautions should be taken in fixing such an apparatus? .. 20

FIRE BRANCH.

PART II., SUBJECT D.—CORRESPONDENCE.

(*Two hours allowed for this Paper.*)

QUESTIONS.

1. Write a letter
   (*a*) To an assured, declining to renew his annual policy on expiry.

Marks.

(*b*) To the introducing agent telling him what has been done 20

2. An office finds that another Company has accepted and issued a policy on a tariff-rated risk at an incorrect rate and writes to say that in consequence it cannot complete an order it has recently received, and enquires what the Company making the mistake proposes to do. Write a reply 30
3. A firm have been advised that it is necessary to cut off two adjoining risks by a party wall, and they write to ask for exact particulars of the wall they are to build. Write a reply in accordance with the general rules and not the requirements of any particular tariff.. .. 30
4. A firm desire to cancel an annual policy which has nine months to run. They have been offered a return of premium after charging short-period rates but are dissatisfied, and ask for three-fourths of the annual premium. Write and explain the position, and try and convince them that you are treating them equitably 30
5. An office has received advice of a fire and has instructed its assessor. Write and acknowledge receipt of the intimation, and say what has been done 10
6. A firm has been advised that, in order to secure a discount for fire extinction appliances it will be necessary to have two fire-plugs on their premises. They reply that they have one plug in their yard and that there is one in the adjacent public street opposite their main entrance, which they presume will meet the office's requirements. Write a reply, giving as fully as possible reasons for your decisions 30
7. A stove stands in an iron dish on wood floor. Write a letter stating what alteration you would suggest, and why 20
8. A proposer objects to give separate amounts on (1) Building, (2) Machinery, (3) Stock, and states that he cannot understand why the office should ask for such a division of his total insurance. Reply as fully as possible. The risk is not controlled by any tariff specification 30

FIRE BRANCH.

Part II., Subject E.—PLAN DRAWING.

(Two-and-a-half hours allowed for this Paper.)

Instructions.

Draw to a scale of 40 feet to one inch.
The measurements given denote feet.
Buildings all of stone or brick unless otherwise described.
All party walls carried through roofs except where otherwise stated.
Doorways and openings are indicated thus ×
Hydrants marked thus ⊕

1. Malt barn and granary, 3 storeys, communicating by double fireproof doors with Nos. 2 and 3; external wood stairs to all floors.

2. Kiln, equal to 4 storeys. From the drying floor, which is on a level with the 3rd storey of No. 1, there is an open gangway 5 feet in width to 3rd storey of No. 7, the doorway at each end protected by single fireproof door; wall between Nos. 2 and 3 is carried up to roof.

3. Kiln, of similar height to No. 2 and with a similar gangway communication to No. 7.

4. Malt barn and granary, 2 storeys, with fireproof cellar at north end; external wood stairs to upper floor.

5. Kiln, 2 storeys, communicating in each case by double fireproof doors with Nos. 4 and 6.

6. Malt Mill, 3 storeys; wall to Nos. 7 and 8 up to roof.

7. Malt deposit, 3 storeys, separated from No. 8 by timber partition.

8. Mash House and Tun Room, 2 lofty storeys, separated from No. 9 by timber partition; communicating with No. 10 by double fireproof doors.

9. Draff House, 1 storey.

10. Still House, 1 lofty storey, communicating with No. 11; wall between Nos. 10 and 11 is carried up to roof.

11. Spirit Receiver House, 1 storey.

12. Boiler House, 1 storey; the firing place at north end is open to yard. Two boilers, each 33 × 7, with flue at back.

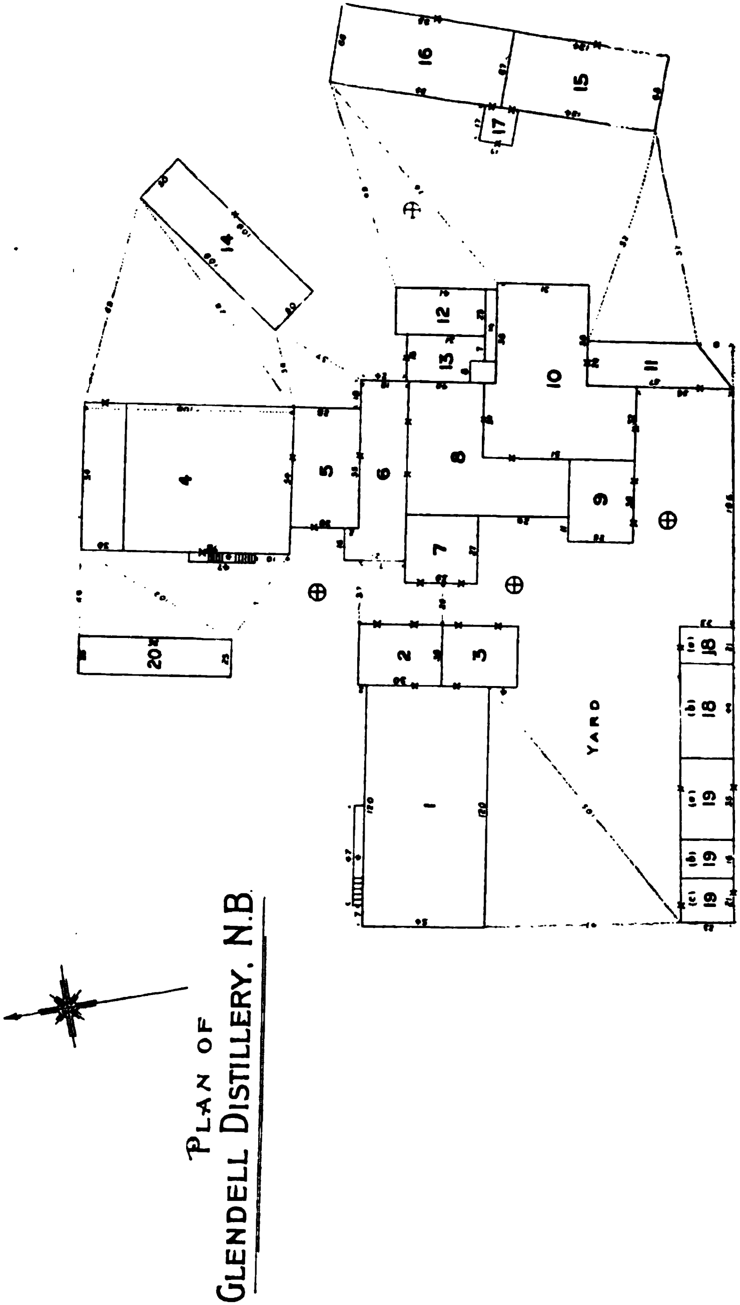
13. Engine House; the chimney at south end is 8 feet square.

14. Duty Free Warehouse, 1 storey.

15. Duty Free Warehouse, 3 storeys. There are 3 windows within 20 feet of non-fireproof roof of Still House.

16. Duty Free Warehouse, 3 storeys.

17. Stone staircase and hoist; the openings into Nos. 15 and 16 are protected by single fireproof doors.



PLAN OF
GLENDELL DISTILLERY, N.B.

18. 1 storey (*a*) Stable, (*b*) Cooperage, divided by wall up to roof; the wall of Cooperage to yard is of timber,

19. 1 storey (*a*) Distillery Office, (*b*) Sample Room, (*c*) Excise Office. The building is under one line of roof and the division walls are of timber.

20. 1 storey, Fuel and Peat Store of timber construction.

FIRE BRANCH.

Part III., Subject A.—LAW OF FIRE INSURANCE AND FIRE INSURANCE CONTRACTS.

(*Two hours allowed for this Paper.*)

Questions.

		Marks.
1.	Upon what matters may the Insured be silent without infringing the obligation as to disclosure of material facts?	20
2.	State briefly the effect of the decision in the case of the King and Queen Granaries	25
3.	What is the course of procedure usually prescribed in respect of arbitration?	20
4.	What is the liability of a Railway Company for damage by fire caused by sparks from its locomotive engines? Quote an illustration from Bunyon	25
5.	What is the liability of a Fire Insurance Company in regard to damage caused by explosion?	15
6	A person wishing to effect an insurance as a transfer from another Company exhibits the old policy but does not mention that an advanced premium has been demanded for the renewal. Would such an omission invalidate the new insurance? State the ruling of an eminent judge.	20
7.	What is arson? What facts must be proved to maintain such a charge?	20
8.	When the written part of a policy is inconsistent with the printed conditions, which must prevail, and why? ..	15
9.	State the doctrine of subrogation and how it may be applied	20
10	Considerable damage has been done to a large and varied stock; the Assured, upon proving that the value of the stock as it stood upon his books was fully equal to the amount of the insurance, claims to abandon it to the office and to have immediate payment made to him in full of the insurance. What is the legal position? ..	20

FIRE BRANCH.

PART III., SUBJECT B.—AVERAGE CLAUSES AND LOSS APPORTIONMENTS.

(*Two-and-a-half hours allowed for this Paper.*)

QUESTIONS.

Marks.

1. Give a general statement of the object and effect of the Conditions of Average and the general Fire Insurance practice with regard to the application and/or non-application of average to insurances 35
2. A merchant holds insurances on stock in two Carriers' Warehouses. £3,000 applying to each, and also a floating insurance of £1,500 on stock in all or any of the Carriers' Warehouses in the district. At the time of a fire his stock is valued at £4,000 in one of the warehouses and £2,000 in the other, while £1,000 is in other warehouses embraced in the floating range. The specific insurances are subject to the 1st Condition and the floating insurance to the two Conditions of Average. What would he be able to recover in the event of a loss of £2,000 in the first-mentioned warehouse? 35
3. A building four storeys in height is insured by the landlord for £10,000 with office A, while office B insured the top storey on account of the tenant (who has an insurable interest in that portion) for £2,000. A fire occurs, leaving only the walls standing, the total cost of reinstatement being £11,000, of which £15,000 is estimated to apply to the top storey. Apportion the loss (*a*) assuming both insurances to be free from Average; (*b*) assuming both to be subject to 1st Condition of Average. The value of the building is £15,000 of which £3,000 would apply to the top storey 50
4. There are four warehouses, Nos. 1, 2, 3, and 4, containing merchandise to the value of £3,000, £2,000, £1,000 and £5,000 respectively. The insurances are as follows:—Office A, £2,000 in No. 1 and £1,000 in No. 4. Office B, £1,000 in No. 1. and £5,000 floating over the four. Office C, £2,000 in No. 2. A fire damages Nos. 3 and 4 to the extent of £500 and £3,000 respectively. Apportion the loss, (*a*) assuming only the floater to be subject to Average (1st Condition); and (*b*) assuming the specific insurances to be subject to 1st Condition of Average and the floater subject to the two Conditions 50

Marks.

5. Apportion the following :—

Office A— £500 on Stock and Utensils.
300 on Machinery.
200 on Gas Engine.

Office B—£1,000 on Stock.
1,000 on Machinery and all other Contents except Stock.

No Average Clause in either Policy.

Loss £2,000, divided as follows :—

Stock	.. £1,200	
Utensils.. ..	.. 50	
Machinery ..	.. 650	
Office Furniture	.. 50	
Gas Engine ..	.. 50	.. 30

FIRE BRANCH.

PART III., SUBJECT C.—FIRE EXTINGUISHMENT AND SPRINKLER INSTALLATIONS.

(*Three hours allowed for this Paper.*)

QUESTIONS.

FIRE APPLIANCES (ORDINARY SCALE):

1. What is the maximum allowance permissible for the provision of the following appliances, viz :—

Boiler pumping engine with hydrants attached and one hydrant connected therewith on each landing of staircase—power always being available to work the pumping engine—together with the necessary hose and also portable chemical extincteurs to scale? 5

2. What is the discount allowed for the provision of a stationary fire engine with hydrants connected therewith fixed in yard together with the necessary hose? 5

PORTABLE FIRE PUMPS:

3. What is the discount allowed for the provision of portable fire pumps? Also state the regulation as to the number to be supplied 5

AUTOMATIC SPRINKLER INSTALLATIONS:

4. Under what circumstances is it necessary to fully equip with sprinklers a shed (having fireproof floor) and which communicates by unprotected openings with a sprinklered building, in order to obtain the full allowance for an approved sprinkler installation? .. 10

Marks.

SPACING OF SPRINKLER HEADS IN RISKS OTHER THAN CORN MILLS:

5. State in the case of a storey where there are bays 21 feet in width, the ceiling being open joisted, the measure of protection required, viz:
   - (*a*) The number of rows of sprinklers down each bay.
   - (*b*) Maximum distance between sprinkler heads across the bays.
   - (*c*) Maximum distance between sprinkler heads down the bays.
   - (*d*) Maximum distance of sprinkler heads from face of walls parallel with the bays.
   - (*e*) Maximum distance of sprinkler heads from walls at end of bays.
   - (*f*) Minimum number of heads required to floor area.
   - (*g*) In ascertaining the floor area of each bay state how the area is to be calculated 20

CORN MILLS:

6. Show by a sketch how sprinkler heads should be fixed on the ceiling, and in the spaces between the machines in the case of centrifugal dressing machines, in Corn Mills where they are fixed one above another and less than three feet apart 15

WATER SUPPLIES:

7. In the case of a sprinkler installation with one approved water supply only, state what is the requirement as to pressure of water at the highest sprinkler and under what conditions this must be maintained for a four-inch installation 5
8. State the approximate pressure of water at a sprinkler head in the top room of a building 50 feet high, the running pressure at the ground level being thirty lbs. to the square inch 15
9. Under what circumstances can two mains which are each less than the size stipulated for in the rules be passed as one of the approved water supplies? 5

ELEVATED TANKS:

10. What would be the minimum tank pressure of water on the highest sprinkler if the tank had its base only ten feet above the sprinkler instead of the fifteen feet as required by the rules? 15
11. What quantity of water (approximately) would a tank measuring sixteen feet in length, fifteen feet in width, and six feet in depth contain? 15
12. Give a formula for calculating the number of gallons of water contained in a circular tank 15

Marks.

PRESSURE TANKS:

13. It is stipulated that the capacity of a pressure tank shall be not less than 5,000 gallons, of which two-thirds must be water.—State

(*a*) What alternative arrangement is allowable.
(*b*) The initial pressure to be pumped up and maintained when the tanks are on a level with the highest sprinkler.
(*c*) The initial pressure to be pumped up and maintained when the tanks are on a lower level than the highest sprinkler 15

PUMPS:

14. (*a*) What kind of a pump is required in the case where town's water is one of the supplies?
(*b*) State the approximate piston speed in feet of a quadruple-acting pump having 4½-inch diameter water piston, with a 12-inch stroke, to yield an output of 170 gallons of water per minute 20

HYDRAULIC INJECTOR APPARATUS:

15. For an injector apparatus (with no direct connection with a town's main) coupled up to a sprinkler installation having 125 sprinklers on one floor, state:

(*a*) The number of gallons of water which must be delivered per minute.
(*b*) The capacity of the suction tank required.
(*c*) The diameter of feed pipe to suction tank .. 10

DRY PIPE SYSTEM:

16. State the maximum number of sprinklers that may be controlled by one main stop and air valve 5

PRESSURE GAUGES:

17. State the regulation as to the provision of a pressure gauge in the case where a pump or hydraulic injector apparatus forms one of the supplies 5

BACK PRESSURE VALVES:

18. State under what circumstances it is not necessary to fix these 5

TESTING:

19. What are the regulations in respect of the devices for testing a dry pipe installation where an ordinary alarm valve is fixed in addition to the air valve? .. 10

FIRE BRANCH.

PART III., SUBJECT D.—ELECTRICITY.

(Two-and-a-half hours allowed for this Paper.)

QUESTIONS.

Marks.

1. Enumerate the different materials commonly used as fuse wires and describe their relative advantages 5
2. Describe some type or types of fuses suitable for the protection of power circuits where the pressure of supply is 500 volts 5
3. What are the uses of an overload and reverse current cut-out? 5
4. Show by diagrammatic sketches what is meant by the wiring of lamps in series and in parallel. Assuming in each case that two lamps of 16 c.p. and two of 32 c.p. are required to be lighted (say 3 watts per c.p.), state the voltage and amperage of each lamp and assume for your calculations that the total voltage of supply be 210 20
5. Describe the relative merits of different forms of ducts for conductors 10
6. Give the insulation resistance required for electric installations of say, 25, 50, 100, 200, and 500 lamps respectively 15
7. In what ways may arc lamps cause fire risk if not properly installed? 5
8. What are the objections to the wiring of premises on a three-wire system throughout? 10
9. Conductors may be insulated with I.R. or with paper or other material. If paper be used, what other protection is necessary, and why? 5
10. For what system of supply should single conductors, insulated with paper, be prohibited as a general rule? Give reasons 10
11. Enumerate the most important matters to be kept in view in the inspection of a Theatre installation .. 10
12. In what manner is an alternating current motor preferable to a direct current motor from a fire-risk point of view? Is the advantageous feature existent in all alternating current motors? 20

FIRE BRANCH.

PART III., SUBJECT E.—CHEMISTRY.

(Three hours allowed for this paper.)

The value of each question is the same.

QUESTIONS.

1. Give a fairly full description of two or three methods of manufacturing producer and water gases. Indicate your preference for one over the other, giving reasons for your preference.

2. Mention three instances of "slow oxidation." Specify the primary and secondary causes and the result.

3. How would you test an oil for the purpose of ascertaining whether it should be allowed for use with wool, &c., in a woollen and/or worsted mill?

4. State the qualities that condition safety in the use of an oil for lubricating:

   (a) Slow-moving heavy shafting.
   (b) Rapid-moving light shafting and machinery.
   (c) What test would you apply to a sample of oil submitted to you? (Physical tests may be given as well as "Chemical" ones.)

5. Give a full account of the manufacture of celluloid and the circumstances under which its storage and/or use may introduce features of special hazard into a risk.

6. Discuss from a Fire Insurance point of view the phrases "ignition point," "flash point."

LIFE BRANCH.

PART I., SECTION B.—PRACTICE OF OFFICES IN REGARD TO PROPOSALS, MEDICAL AND OTHER REPORTS. FORMS OF POLICIES AND CONDITIONS OF ASSURANCE.

(Two-and-a-half hours allowed for this Paper.)

QUESTIONS.

Marks.

1. Draft a reply to a letter from a gentleman asking the rate of premium for an Endowment Assurance Policy of £1,000, payable at age 50 or on the previous death of a proposer aged 34. Explain the advantages of the bonus system with which you are most familiar .. 14

	Marks.
If you would rather that the proposer effected an ordinary whole-life policy, would it be advisable to recommend such an assurance?	4
Assuming that it is so, draft a clause in your letter to that effect	10
2. Give shortly the meaning of the following medical terms, and state in each case whether under ordinary circumstances a life can suffer from such a disease (or symptom) and afterwards be insured:—	
Albuminuria	6
Angina Pectoris	6
Embolism	6
Empyema	6
Cystitis	6
Hodgkin's Disease	6
Meningitis	6
Renal Calculus	6
Myopia	6
Myelitis	6
3. With a view of securing more life business, draft or sketch a half-page advertisement for the "Cormorant Insurance Company, Limited"	24
4. Give briefly a list of the principal questions which should be embodied in a life assurance Proposal Form, or in the form of statement made before the Medical Examiner. Which questions, if any, do you think should be asked in both of the forms?	48
5. Draft an endorsement on a policy for the whole of life which the assured wishes converted into a paid-up assurance	20
6. Where proposals for ordinary assurances for the whole of life are made, what annual extras, if any, would you charge?—	
(*a*) Officer Indian Medical Service..	4
(*b*) Matron of fever hospital, aged 43	6
(*c*) Draft a license, making a policy, issued to a Staff Surgeon in the Royal Navy, "world-wide and occupation-free," charging him a uniform annual extra	10

LIFE BRANCH.

PART II., SECTION A.—ELEMENTARY PRINCIPLES OF THE LAW RELATING TO LIFE ASSURANCE. USAGE IN REGARD TO LOANS ON POLICIES, SURRENDERS AND THE SETTLEMENT OF CLAIMS. CORRESPONDENCE WITH HEAD OFFICE OR BRANCHES, AGENTS, AND THE PUBLIC.

(*Three hours allowed for this Paper.*)

QUESTIONS.

1. A bank agent is also agent for an Insurance Company. He has shares in the bank and a policy on his own life for £1,000 with the Company, the surrender value of which is £55, and on which policy he has a loan from the Company of £50. The premium on this policy was due a week ago and the receipt has been sent to him. He has also other receipts and should have £100 of the Company's money in his possession. He gets into financial difficulties.

	Marks.
(*a*) What should the Branch Manager of the Company first do?	10
(*b*) Has the Bank a better right to his bank shares than the Company?	10
(*c*) Has the Company a better right to the policy than the Bank?..	10
(*d*) Have either the Bank or the Company a better right to these and his other assets (if any) than the other creditors?	10
(*e*) If the agent has absconded after previously signing the receipt for the premium on the policy on his own life, and leaving it in the till of the Bank—	
(1) To whom does it belong?	10
(2) Does the incident affect the title of the creditors to the policy?	10
(3) Should the premium be held as paid to the Company?	10

2. What are the terms of the "Policies of Assurance Act of 1867" in regard to notices of assignment?	40
3. What are the stamp duties on—	
(*a*) A double endowment policy?	8
(*b*) A reassurance policy under seal	
(1) In England?	8
(2) In Scotland?	8
(*c*) The guarantee of reassurance of an annuity bond?	8
(*d*) A household redemption policy?	8

Marks.

4. A policyholder, who transacts his insurance business through a Branch Office, wishes a loan on his policy. State shortly the procedure followed by the Company before the money is advanced to the applicant .. 50

LIFE BRANCH.

PART II., SECTION B.—BONUS SYSTEMS.

METHOD OF CALCULATING EXPENSE RATIOS.

(*Two hours allowed for this Paper,*)

QUESTIONS.

1. Describe shortly the methods in which any four existing British Mutual Life Assurance Societies divide their profits 40
2. Compare the advantages of insuring in a Mutual Society and in a Proprietary Company 30
3. Draft a letter to a possible proposer pointing out the advantages of insuring in a Company of either kind 20
4. What are the effects on the expenses and profits of a Company of completing a large amount of—
   (*a*) Non-profit Policies ? 15
   (*b*) Endowment Assurance Policies ? 15
   (*c*) Ordinary Whole Life Policies with limited payments ? 15
   (*d*) Reassurance Policies 15
5. What do you consider a fair rate of interest to assume in a valuation, and give your reasons for so doing ? .. 20
   What is the rate now usually assumed by British Offices ? 10
6. What do you understand by an O^m O^m (5) and an H^m H^m (5) valuation ? 20

ACCIDENT BRANCH.

PART IA., SUBJECT :—CORRESPONDENCE.

(*One-and-a-half hours allowed for this Paper.*)

QUESTIONS.

1. An agent having a monthly account is three months in arrear in his settlements. Write suitable letters to the agent—
   (1) In a case where the arrear is chronic.
   (2) In a case where the agent is in arrear for the first time 30

Marks.

2. The Branch Business Returns are behind those of the preceding year as at the end of September. Draft a circular letter to the Branch Agents. (The Company's Accounts are made up as at 31st December) 20
3. Reply to a Personal Accident Policy-holder who writes saying that he cannot afford to renew his policy and intends to let it lapse 30
4. An agent writes saying that another office is giving much better benefits than those offered by your office and for the same premium and that, therefore, he cannot obtain any business. Reply to him 30
5. A farmer is thrown out of a trap at 10 p.m. on his way home. There are said to be no witnesses of the accident. Head Office ask the Branch to investigate the claim and report particularly as to assured's sobriety at the time of the accident. Write a report to Head Office giving the result of your investigations 30
6. An assured under a Personal Accident Policy sustains hernia from an accidental cause. After the first week he is practically able to do his usual duties wearing a truss. Assured claims the full 26 weeks' Partial Disablement Allowance under his policy. Reply combating this view.. 30
7. An assured is claiming in respect of an accident for a much larger sum than he is reasonably entitled to. The agent says that if Head Office do not give the assured what he asks for, his business in the district will suffer very considerably. Write the agent .. 30

ACCIDENT BRANCH.

Part Ic., Subject:—CLASSIFICATION OF RISKS (Personal Accident).

(One hour allowed for this Paper.)

Questions.

1. Into what divisions are occupations usually made in classifying likely insurers? Give examples 100
2. In considering the classification for an accident and disease policy, mention some occupations which would require to have an extra rate charged and give reasons 50
3. How would you classify architect, building surveyor, farmer working, hotel keeper (*a*) first class, (*b*) serving in bar, quarry master superintending, and veterinary surgeon? 50

ACCIDENT BRANCH.

Part Id., Subject:—KNOWLEDGE OF EMPLOYERS' LIABILITY.

(*One-and-a-half hours allowed for this Paper.*)

Questions.

	Marks.
1. Describe the allegations which are necessary to bring a claim under the Employers' Liability Act, 1880, for personal injury to a workman	50
2. What is the limit of compensation recoverable under the Employers' Liability Act, 1880, and how is this calculated? Within what time must claims be made (*a*) in case of temporary injury, and (*b*) in case of death?	20
3. What are the provisions as to notice (*a*) in case of disablement, and (*b*) in case of death under the Workmen's Compensation Acts, 1897 and 1900?	30
4. Under what circumstances may the Court dispense with the notice as a bar to claim?	25
5. An accident having happened to the employee of a blacksmith and farrier using no machinery but through defective tools used by the employer, would the claim come under the Employers' Liability Act, 1880, and could the workman claim under the Workmen's Compensation Act, 1897? Give reasons	50
6. When an employer sets a workman to agricultural work as well as other work, would the workman be entitled to the benefit of the Workman's Compensation Act, 1900, in the event of an accident happening to him while engaged in such work?	25

ACCIDENT BRANCH.

Part IIa., Subject:—CLAIMS AND THEIR SETTLEMENT.

(*One-and-a-half hours allowed for this Paper.*)

Questions.

Personal Accident.

1. Define temporary total disablement. Define temporary partial disablement	20
2. Assume a solicitor has broken his leg and is confined to his room, and assume further that he is able to sign all documents that require his signature, to dictate letters,	

Marks.

and give his clerks all necessary instructions. He claims the total disablement allowance under his policy whilst he is confined to his room and house. Would you allow his claim? Give arguments for and against .. 25

3. An assured is entitled to a capital sum in the event of his sustaining "complete and irrecoverable loss of sight in an eye." The assured is struck in the eye by a ball, sends the Company in a certificate from his doctor to the effect that the sight of one eye is permanently destroyed and claims the capital sum. What questions would you ask the assured's doctor? 25

4. An assured sustains synovitis of the knee and his doctor estimates the disablement at four weeks "total" and three weeks "partial"; the Company pays this sum within a fortnight of the occurence of the accident and obtains a receipt in full discharge. One month after the date of the accident assured slips coming down stairs, which slip induces the return of the synovitis and assured is once more totally laid up. He makes a further claim for the increased period of disablement due to the slip. How would you deal with the further claim? 25

Employers' Liability Act.

1. A chain breaks and a workman is injured thereby. Under what circumstances will the workman have a claim against his master and under what circumstances will he not?

   (*N.B.*—The Workmen's Compensation Act must be considered as non-existent for the purpose of answering this question) 25

2. A workman meets with an accident whilst working a machine. It is admitted that he was not using a guard when the accident happened, but it is alleged that even had the man been using it he would have been injured, and, further, that the guard provided was not of the best pattern. What enquiries would you make of the employer to enable you to write to the claimant's solicitor? 25

Workmen's Compensation Act.

1. In settling direct with a workman, who cannot read or write, a claim for permanent partial disablement under the Workmen's Compensation Act, what precautions would you take to safeguard the Company from a plea being hereafter raised that the injured man did not know that the payment was meant to be a final one? 25

Marks

2. A workman has been employed by a firm for the following periods :—

5/1/1900—24/7/00.
2/10/00 — 25/5/01.
2/12/01 — 12/4/03.

In both July, 1900, and July, 1902, the man had a fortnight's holiday, during which period he received no wages. From July to October, 1900, he was working for another firm. From May to December, 1901, he was at home ill unable to do any work and receiving no wages. On the 12/4/1903 he was killed by an accident, leaving dependants wholly dependent on him. The employer admits liability under the Workmen's Compensation Act. The deceased's wages were 30s. a week and a cottage rent free, worth, say, £7 per annum. What amount should his dependants claim for, and show how you arrive at it? 30

ACCIDENT BRANCH.

PART IIB., SUBJECT :—POLICY DRAFTING.

(*One hour allowed for this Paper.*)

QUESTIONS.

1. It is desired to exclude temporary partial disablement from an ordinary Accident Policy. Draft an endorsement to this effect 25
2. Give the narrative clause of a Policy insuring (*a*) Superintending Quarry Master, (*b*) Engineer mechanical superintending, and (*c*) Licensed Victualler; *ex* bar and cellar risks 50
3. A proposer under an Accident and Disease Policy states that he has previously suffered from cancer but is discharged as cured. Draw an endorsement to protect the Company in the event of an accident occurring which caused the cancer to again make its appearance 50
4. Draw an endorsement to cover all accidents of occupation, that is, whether coming under the Acts of Parliament or Common Law 25
5. Draw an endorsement covering all accidents of occupation but excluding fatal accidents 25
6. An employer is doubtful whether his occupation comes under the Workmen's Compensation Act, 1897, but desires that his men should get the full benefits of that Act in case of accident. Draw an endorsement to this effect 25

ACCIDENT BRANCH.

PART IIc., SUBJECT :—INDEMNITY (Third Party)

(*One-and-a-half hours allowed for this Paper.*)

QUESTIONS.

CORRESPONDENCE.

	Marks.
1. Write a letter to an employer, engaged as a Building Contractor, pointing out the advisability of Third Party insurance	25
2. The Builder having expressed his desire to take out a policy, write a letter asking information as to his work and any other points that suggest themselves to you	25

CLAIMS.

3. The tenant of a shop is injured while a plumber is at work, through his having left a manhole open. What would the tenant require to allege against the employer of the plumber to found a claim against him?	20

SETTLEMENT.

4. The tenant of shop above referred to was a lady having a turn-over of £10 per week, and her injury was sprained ankle. How would you settle the claim, being satisfied the employer was liable?	30
5. In a 'bus accident an Auctioneer, a Merchant, and a Barrister are injured. How would you settle the claims, the first two having been seriously and permanently injured and the last only shaken? ..	30

LEGAL ASPECTS.

6. Give examples of what would be considered fault and negligence on the part of an assured who held a Third Party Policy	25
7. What are the usual grounds of a claim against an employer by a member of the public injured through the fault of the employer or his servants?	25
8. What would be the chief grounds of defence to such a claim?	20

ACCIDENT BRANCH.

PART IId., SUBJECT:—MEDICAL AND SURGICAL TERMS.

(*One hour allowed for this Paper.*)

QUESTIONS.

	Marks.
1. Explain the following?—	
(*a*) Fracture of Clavicle.	
(*b*) Fracture of the Fibula and Tibia.	
(*c*) Fracture of the Humerus.	50
2. What are meant by the following:—	
(*a*) Pelvis.	
(*b*) Pharynx.	
(*c*) Uræmia.	
(*d*) Lumbar Region.	50
3. Explain in your own language the following:—	
Emphysema.	
Peritonitis.	
Septicæmia.	50
4. Name the bones in the arm from the shoulder to the fingers	50

ACCIDENT BRANCH.

PART IIIA., SUBJECT—LAW: RELATIONSHIP BETWEEN EMPLOYER AND EMPLOYED.

(*Two hours allowed for this Paper.*)

QUESTIONS.

FATAL ACCIDENTS ACT, 1846.

1. What change in the relationship between employer and employed did this Act bring into effect?	10
2. What are the grounds of claims allowed by this Act? ..	10
3. What are included by the words "Parent" and "Child"?	10
4. What changes were made by the amended Act of 1846?	10

FACTORY AND WORKSHOPS ACTS.

1. Describe generally the duties of an employer for the safety of his workpeople as contained in this Act?	15
2. What penalty is imposed in the event of accident through neglect to observe provisions of the Act and how may	

Marks.

these fines be applied? What exceptions are provided by the Act? 5

3. What are the obligations upon parents under this Act and also upon the workmen as to certificates and declarations? 10
4. Mention the general regulations on employers in dangerous and unhealthy occupations 10
5. In what factories or workshops may ventilation by fan be adopted on the request of the Inspector? What would be the effect of neglecting this method of ventilation (1) to the employer under this Act and (2) in a claim by the workman against his employer for injury? .. 10

EMPLOYERS' LIABILITY ACT, 1880.

1. What is usually stated as the grounds of action against an employer for damages under this Act? 10
2. What are the grounds of defence to claims under this Act? 10
3. What is provided as to penalties under other Acts (*a*) when compensation obtained under this Act in the first instance, and (*b*) when penalties already obtained under other Acts? 10
4. What is the maximum sum recoverable under this Act, and within what time must notice of injury be made and proceedings taken in case of disablement and of death? 10

WORKMEN'S COMPENSATION ACTS, 1897 and 1900.

1. Mention the chief occupations to which this Act applies 10
2. In the event of injury to the workman of a sub-contractor, would the "undertaker" be responsible? Give reasons 10
3. Has the "undertaker" any right of relief and under what circumstances does the provision in the Act as to sub-contracting not apply? 10
4. A workman having been injured by the fault of a third party, can the employer claim indemnity from such third party? What would be the rights of the workman in such circumstances as to proceeding against his employer or the third party? 15
5. What are the provisions of this Act as to Insurance Companies in the event of bankruptcy of the employer? 5
6. Is a workman bound to submit himself for medical examination? What is the effect of refusal? .. 5
7. After what time may an employer apply to have the weekly compensation redeemed by payment of a lump sum? How would you fix the redemption of half wages of 15/- a week in the case of a skilled workman, aged 40 next birthday, who had sustained the loss of an arm? 15

ACCIDENT BRANCH.

PART IIIB., SUBJECT:—LAW RELATING TO ACCIDENT INSURANCE.

(*One-and a-half hours allowed for this Paper.*)

QUESTIONS.

Marks.

1. An Accident Policy covers against "any bodily injury caused by violent accidental external and visible means." The Policy contains the usual condition excluding death or injury "arising from natural disease or weakness," etc., etc. An assured stooped to pick something off the floor and apparently nothing unusual occurred. It was found afterwards, however, that in stooping down the cartilage of his knee joint had been dislocated. Is this accident within the terms of the policy? Discuss fully 40
2. In what way does the statute commonly known as the Gambling Act affect Personal Accident Insurance? .. 20
3. In what way does "the Policies of Assurance Act, 1867" affect Personal Accident Policies? 30
4. A person insured under a General Accident Policy takes a bathe in the sea and whilst in the water has an apoplectic seizure and is drowned. Is the Company liable? Give full reasons for your answer 35
5. A proposer in filling up a Personal Accident Proposal Form signs a statement in the presence of the Company's Agent to the effect that he is in good health and has no physical infirmity. A policy is duly issued. Proposer had lost one leg, which fact was obvious to anyone who saw him. Assured meets with an accident and claims under his policy. When obtaining particulars with regard to the claim, it comes to the Company's knowledge that the assured has already lost one leg, and they thereupon give the assured notice that his policy is void, and decline to admit any claim. Would the Company's claim that the policy was void stand in law? Discuss fully .. 40
6. What is the difference from a legal standpoint between a warranty and a representation as concerning the replies to the questions in a proposal for Personal Accident Insurance? 20
7. Explain the meaning in connection with an accident of *causa proxima* and *causa causus*, giving concrete examples 15

ACCIDENT BRANCH.

PART IIIc., SUBJECT:—LAW RELATING TO EMPLOYERS' LIABILITY (CONTINENTAL).

(One-and-a-half hours allowed for this Paper.)

QUESTIONS.

	Marks.
1. State what compensation is payable under the Belgian Act which came into force on the 1st July, 1905 ..	20
2. Compare the methods adopted in Germany and Austria for arriving at the premium to be paid by any particular employer of labour to cover his liability under the respective Accident Insurance Laws of the two countries in question	30
3. Discuss the reason of the great increase in the number of claims for temporary disablement shown by the German and Austrian statistics in particular and by European statistics in general	30
4. State in what manner France, Germany, and Austria provide for the security of the compensation payable under their respective Accident Laws	30
5. Which Continental countries permit Permanent Total and Permanent Partial Disablement Claims to be commuted, either wholly or partially; on what basis, and to what extent?	30
6. State how soon compensation commences after the happening of the accident in the following countries, and give any reasons you can to account for the great difference shewn:—Germany, Austria, Italy, Belgium, France, Sweden, and Denmark	30
7. Mention any special provisions as regards the compensation of apprentices, unsalaried assistants, etc., appearing in the Accident Insurance Laws of any Continental countries	30

NAMES OF SUCCESSFUL CANDIDATES—1906.

The following is the Official List of the Successful Candidates at the Examinations held simultaneously at the various Insurance centres, April 2nd to 12th, 1906. The letter "P" opposite a name signifies Pass, "H" Honours, and "C" Certificates accepted to 11th May, 1905.

FIRE BRANCH.

	Part I.								Part II.									Part III.					
	Policy Drafting.								Tariffs.			Processes.											
	Potteries.	Woollen Mills.	Re-Insurances.	F.O.C. General Rules.	Book-keeping.	Chemistry.	Electricity.	Passed in Part I.	Furniture Stores.	Potteries.	Woollen Mills.	Pottery.	Woollen.	Building Construction.	Correspondence.	Plan Drawing.	Passed in Part II.	Law of Fire Insurance.	Avge. Clause and Loss Apportnmt.	Fire Extinguishment.	Electricity.	Chemistry.	Passed in Part III.
Aberdeen.																							
Anderson, John A. C., *Union* ...	...	...	H	H	C	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kynock, Walter M. C., *Union* ...	...	...	...	...	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Birmingham.																							
Brown, Herbert, *Atlas*	...	...	...	...	...	...	...	...	H	P	...	...	...	...	P	P	...	...	...	...	...	...	...
Burrow, George W., *Sun* ...	...	...	...	...	...	...	C	...	P	H	...	P	...	...	P	...	...	...	...	...	...	...	...

NAMES OF SUCCESSFUL CANDIDATES, 1906—*continued.*

	PART I. Policy Drafting. Potteries.	PART I. Policy Drafting. Woollen Mills.	PART I. Re-Insurances.	PART I. F.O.C. General Rules.	PART I. Book-keeping.	PART I. Chemistry.	PART I. Electricity.	PART I. Passed in Part I.	PART II. Tariffs. Furniture Stores.	PART II. Tariffs. Potteries.	PART II. Tariffs. Woollen Mills.	PART II. Processes. Pottery.	PART II. Processes. Woollen.	PART II. Building Construction.	PART II. Correspondence.	PART II. Plan Drawing.	PART II. Passed in Part II.	PART III. Law of Fire Insurance.	PART III. Avge. Clause and Loss Apportnmt.	PART III. Fire Extinguishment.	PART III. Electricity.	PART III. Chemistry.	PART III. Passed in Part III.
BIRMINGHAM—*continued.*																							
Charlwood, Ed. C. H., *Guardian*	P	...	...	...	...	C	...	...	P	H	...	H	P	P	P	P	...	..	...	...	...	...	...
Copeland, Colin A., *Alliance* ...	...	...	H	...	...	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Davies, Godfrey E., *Alliance* ...	...	...	...	...	...	C	...	1906	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Farrol, Harold E., *Central* ...	P	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...
Green, Fred John, *Guardian* ...	...	...	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Holland, Geo. P., *Royal Exchange*	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
McRobert, Jas. H., *Alliance* ..	...	...	...	...	...	...	...	...	P	H	...	...	...	...	...	...	1906	...	P	...	...	...	...
Robinson, Reg. Y., *Atlas* ...	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Skempton, Leonard, *Royal* ...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sparshott, Harry L., *Scottish Union and National*	...	...	...	...	...	C	...	...	...	H	...	...	...	...	...	...	...	...	...	...	...	...	...

Townson, Tom Harry, *Guardian*	...	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Vines, Chas. Henry, *Atlas* ...	P	...	P	H	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wheeldon, Oscar, *Caledonian* ..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	...	...	...	...	...
Williams, Edgar J., *Scottish Union and National*	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
BRIGHTON.																							
Armstrong, Robert P., *Royal Exchange*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	...	...	...
BRISTOL.																							
Biggs, George Travers, *Sun* ...	P	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bodinnar, A. C., *Western* ...	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Burnard, F., *London and Lancashire*	...	...	P	H	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...
Chapman, Guy C., *Hand-in-Hand*	P	...	P	P	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...
Dagge, Arthur Hy., *London Assurance*	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Davies, Mervyn John R., *Royal Exchange*	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...
Gane, Chas. Ed., *Alliance* ...	...	...	...	...	C	...	...	...	...	...	..	...	...	...	...	...	..	...	...	...	...	...	...
Harrison, C. H. T., *Atlas* ...	H	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Head, George Oliver, *Western* ...	P	...	P	H	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kepple, Reg. Hy. John, *Sun* ...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	P	...	P	...	...	...	...	...

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Bristol—*continued.*																							
Lucas, A. H., *Hand-in-Hand* ...	P	...	...	...	...	...	...	...	P	P	...	P	...	...	P	...	...	...	...	..	...	...	...
Mason, Robert, *London and Lancashire*	...	...	...	...	...	...	...	...	P	..	...	...	...	...	...	...	...	...	...	...	...	...	...
Peek, Harold John, *Hand-in-Hand*	...	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Phillipps, John R., *Norwich Union (Exeter)*	...	...	...	...	...	...	...	...	...	H	...	...	...	P	...	...	...	P	...	...	...	...	...
Poole, Reg. Harding, *Northern* ...	P	P	P	P	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...
Poole, Wm. Henry, *Northern* ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	...	...	...
Routley, Henry Ivor, *Norwich Union*	P	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Shellard, Hy. M., Jun., *Hand-in-Hand*	...	...	...	...	...	...	...	...	H	H	P	P	P	...	...	...	...	...	...	...	...	...	...
Waltham, Wm. Hy., *Alliance* ...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Williams, Fredk., *Norwich Union*	P	...	...	...	...	...	...	...	H	H	...	...	...	P	P	P	...	...	...	...	...	...	...

DUBLIN.																							
Broadbent, Robert S., *Alliance* ...	...	...	...	...	...	...	...	...	P	P	P	...	H	H	P	H	...	...	...	...	...	...	...
Campbell, Wm. P., *Royal Exchange*	...	...	...	...	...	...	...	...	H	P	...	...	...	...	...	P	..	...	...	...	...	...	...
Scott, Chas. Cowan, *Royal Exchange*	...	...	...	...	...	...	...	...	P	H	H	P	H	H	P	P	...	...	...	...	...	...	...
Simpson, Wm. Hy., *Phœnix* ...	...	...	P	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sparrow, Geo. F., *London and Lancashire*	...	...	...	...	...	...	...	...	P	...	...	...	..	...	...	H	1906	...	...	...	...	...	...
Verdon, Joseph Robert, *Phœnix*	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...
DUNDEE.																							
Duthie, Harry L. A., *State* ...	P	...	P	P	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Low, Alex. S., *Royal Exchange* ...	...	...	...	P	...	...	...	..	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...
Marquis, Arthur, *North British and Mercantile*	...	...	...	...	...	...	...	1906	...	...	...	P	...	H	P	P	1906	...	...	...	...	...	...
Miller, Thomas J. G. A., *Royal*	P	P	...	...	C	...	...	1906	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Simpson, Alex. Manson, *State* ...	...	...	H	...	...	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...
Stewart, W. M. H., *North British and Mercantile*	.:.	...	...	...	...	...	...	1906	...	...	...	P	...	H	P	P	1906	...	...	...		..	..
EDINBURGH.																							
Anderson, John McG., *Scottish Union and National*	...	...	...	...	...	...	...	...	...	...	...	P	...	...	...	...	...	...	...	...	...	..	...
Carlin, J. Smith, *West of Scotland*	...	...	...	P	C	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...
Davidson, George L., *Phœnix* ...	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	.

NAMES OF SUCCESSFUL CANDIDATES, 1906—*continued.*

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Edinburgh—*continued.*																							
Fisher, Alan, *Century*	P	...	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fyfe, Henry M., *North British and Mercantile*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	P	1906	P	...	...	...	...	...
Green, George H., *Caledonian* ...	...	...	...	..	C	...	...	...	...	P	...	P	...	...	P	H	...	...	...	...	...	...	...
Isdale, John David, *Scottish Union and National*	P	...	...	...	...	...	...	...	P	H	...	P	...	...	P	P	...	...	...	...	...	...	...
Jeffrey, Jas. Bell, *General Accident*	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Maclennan, D. Alex., *Scottish Union and National*	...	...	...	...	...	...	..	...	...	...	...	P	...	...	...	...	...	...	...	...	...	...	...
McDiarmid, A., *Scottish Union and National*	...	...	...	...	...	...	...	...	...	...	...	P	...	...	...	P	...	...	...	...	...	...	...
Oliver, Chris., Jun., *Liverpool and London and Globe*	P	..	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rose, Wm., Jun., *Liverpool and London and Globe*	...	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stewart, John C., *Royal* ...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	P	...	...

GLASGOW.																							
Hodge, Jas. Wm., *West of Scotland*	...	...	...	...	C	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hosick, Albert K., *North British and Mercantile*	P	...	...	H	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
King, David M., *Westminster* ...	P	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Laidlaw, J. Hunter, *North British and Mercantile*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	1906
Mair, Robert Howie, *Liverpool and London and Globe*	...	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
MacIntyre, Arch., *Atlas* ...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Robertson, Wm. B., *Liverpool and London and Globe*	...	...	...	...	...	...	C	1906	P	H	...	P	...	...	...	...	...	...	...	...	...	...	...
Robertson, Stewart, *Westminster*	...	...	...	...	...	...	...	...	H	P	P	P	P	...	P	...	...	...	...	...	...	...	...
Strang, John, *Westminster* ...	P	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
IPSWICH.																							
Forrest, Chas. Albert, *Alliance* ...	P	...	H	H	...	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Haward, Arthur Wm., *Alliance* ...	P	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lewin, Gilbert F. A., *Alliance* ...	P	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
LEEDS.																							
Armstrong, Wm. C., *London and Lancashire*	P	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Braithwaite, W. Ed., *Royal* ...	P	P	H	...	...	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

NAMES OF SUCCESSFUL CANDIDATES, 1906—*continued.*

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LEEDS—*continued.*																							
Brown, Stanley, *Phœnix*	...	...	P	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...
Buckley, Herbert S., *London and Lancashire*	...	...	...	...	...	...	...	...	...	...	...	...	...	P	...	...	...	...	...	...	...	...	...
Burdekin, James, *Sun*	P	...	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Casson, Alan John, *Hand-in-Hand*	P	...	H	H	...	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cowlam, Frank, *Law Union and Crown*	P	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dixon, Cecil, *Liverpool and London and Globe*	...	...	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dixon, Henry, *Hand-in-Hand* ...	P	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Farnell, Thos. Wm., *Century* ...	P	...	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Goddard, Albert Wm., *Royal* ...	...	...	...	...	...	...	...	...	H	...	...	...	...	...	H	P	...	...	...	...	...	...	...
Hawkins, Frank, *Phœnix* ...	P	...	H	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	..	...

LEEDS—*continued.*																							
Illingworth, H. H., *Alliance* ...	...	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Pellow, F. G., *Royal*	...	...	...	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Sunderland, E. A., *Hand-in-Hand*	...	...	H	...	...	...	...	...	H	H	H	P	P	...	P	P	...	...	...	...	...	...	...
Walshaw, Hubert, *Liverpool and London and Globe*	...	...	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wolstenholme, Frank, *Sun* ...	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
LEICESTER.																							
Charters, G. E. M., *Alliance* ...	...	...	...	...	...	...	...	...	P	P	P	P	...	...	P	...	...	...	...	...	...	...	...
LIVERPOOL.																							
Butler, Samuel Percy, *Royal* ...	...	...	...	P	...	C	C	1906	...	...	...	...	...	...	...	...	1906	...	...	...	...	...	...
Colbeck, Thomas O., *General Accident*	...	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Cushnie, Geo. S. B., *Liverpool and London and Globe*	...	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Davies, Ed. Harold, *Northern* ...	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Henshall, Wilfrid D., *Liverpool and London and Globe*	H	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Monkhouse, Jno. J., *Northern* ...	...	...	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
O'Neill, Harold E., *Northern* ...	P	P	...	...	...	C	...	...	H	P	...	P	H	H	P	P	...	...	...	...	...	...	...

NAMES OF SUCCESSFUL CANDIDATES, 1906—*continued.*

	Part I.								Part II.									Part III.					
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LONDON.																							
Angas, H. Sample, *Hand-in-Hand*	P	...	H	H	...	...	...	...	...	...	...	...	...	..	.	...	...	...	...	...	...	...	...
Bourne, Francis R., *Royal* ...	..	...	H	H	...	...	...	...	...	..	...	...	...	...	..	...	...	...	...	...	...	...	...
Bowdon, Frank E., *Hand-in-Hand*	...	...	...	...	...	...	...	...	P	P	...	H	...	H	...	...	...	...	...	...	...	...	...
Buttery, Harry R., *Hand-in-Hand*	...	..	...	...	...	...	...	...	...	...	...	H	...	...	...	...	1906	P	...	P	...	...	...
Elliott, Percy St. John, *Law Union and Crown*	...	...	H	P	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	..	...
Finnis, Henry John, *Hand-in Hand*	P	...	P	H	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...
Hassell, Chas. B., *Guardian* ...	...	...	...	...	...	...	...	..	H	H	H	P	H	H	H	P	...	...	...	...	...	...	...
Hayman, Alfred, *Century* ...	P	...	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Henderson, John, *Hand-in-Hand*	...	...	...	...	...	C	C	1906	...	...	...	P	P	H	...	...	1906	H	H	...	...	P	...
Matthews, Edgar H., *Sun* ...	...	...	P	H	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Minnion, Ernest H., *Hand-in-Hand*	...	...	...	..	C	...	C	1906	...	...	...	...	...	...	...	...	1906	H	...	H	...	...	...
Moore, Wm. Leith, *Scottish Union and National*	...	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Pettiman, Wm. Chard, *Liverpool and London and Globe*	...	...	P	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Robinson, Chas. A., *Hand-in-Hand*	...	...	...	...	...	...	...	...	...	P	...	...	...	P	P	P	...	...	...	...	...	...	...
Silverthorne, A. G. T., *Northern*	P	...	P	P	C	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tregaskis, Geo., *Sun*	P	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	..
Tregaskis, Oswald, *Sun*	P	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
MANCHESTER.																							
Barker, John A., *Northern* ...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bagnall, Harold H., *London and Lancashire*	H	P	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Birch, Wm. Thos., *Sun*	...	...	...	...	...	...	...	...	P	P	...	...	P	...	H	...	...	...	...	..	...	...	...
Brackenridge, Harold, *Scottish Union and National*	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...
Butler, Reginald, *Law Union and Crown*	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chambers, Leonard, *Law Union and Crown*	P	P	...	...	...	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Coe, Harold G., *Royal*	...	...	...	...	...	C	...	1906	...	...	...	...	...	...	...	P	1906	...	..	H	...	...	...
Cowen, Herbert D., *Norwich Union*	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dawson, Allan, *State*	P	...	H	P	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Fisher, Arthur H., *Norwich Union*	P	..	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

NAMES OF SUCCESSFUL CANDIDATES, 1906—*continued.*

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Manchester—*continued.*																							
Grimshaw, W., *Co-operative* ...	...	...	...	...	C	...	...	1906	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hirst, Percy B., *North British and Mercantile*	...	...	...	...	C	C	...	...	...	...	...	...	...	...	...	P	...	...	..	...	...	...	...
Jones, Cyril C., *Northern* ...	...	...	H	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Mason, James Herbert, *Northern*	...	...	...	...	...	...	C	...	...	H	P	...	...	...	P	...	...	...	...	...	...	...	...
Penney, William, *Sun*	P	P	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Smith, S. A. G., *Alliance* ...	...	...	...	...	...	...	C	1906	...	...	...	...	...	...	...	..	...	...	...	...	H	...	...
Stansfield, Arthur W., *Sun* ...	...	...	...	...	...	...	...	...	H	...	...	...	...	...	...	...	..	P	P	P	...	..	..
Vasey, Roland, *Westminster* ...	P	P	H	H	C	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	..
Whittaker, Hermann, *Liverpool and London and Globe*	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Yorston, Chas., *British Law* ...	P	...	...	...	...	...	...	...	...	...	...	...	...	H	...	..	...	...	...	...	...	..	...

NEWCASTLE-ON-TYNE.																							
Allen, Donald C., *North British and Mercantile*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	H	...	...	...	...	...	...	...
Barclay, John H., *Atlas*	...	...	...	...	C	...	...	1906	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bibby, Jas. Victor, *Alliance* ...	P	P	H	...	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bonnor, Thos., *London and Lancashire*	P	...	...	H	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chapman, Ernest H., *London and Lancashire*	...	...	...	...	C	..	...	...	H	H	...	...	...	...	...	...	..	...	...	...	...	...	...
Davison, Thomas, *Alliance* ...	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dobson, Harold P., *British Law*	...	...	...	...	...	C	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...
Gofton, John Philip, *Royal* ...	...	...	...	...	...	...	C	...	P	P	...	P	P	...	P	...	...	...	...	...	...	...	...
Gofton, Wilfrid, *London and Lancashire*	...	...	...	...	...	...	...	...	H	...	...	...	...	...	...	H	...	...	...	...	...	...	...
Heron, Albert Jas., *Commercial Union*	P	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hicks, Jas. E., *North British and Mercantile*	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	1906	...	..	...	...	...	...
Hughes, Alex. Victor, *Scottish Union and National*	P	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hughes, Bertram, *Union* ...	...	...	...	...	C	C	C	1906	H	...	...	...	..	P	P	H	1906	...	...	...	...	...	...
Jackson Ed. Potts, *London and Lancashire*	...	...	P	P	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kinnis, Jas. Alex., *County* ...	...	...	...	P	...	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Marrs, Alex. M., *Royal Exchange*	...	...	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Marshall, Stanley, *Norwich Union*	...	...	...	...	C	...	C	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...

NAMES OF SUCCESSFUL CANDIDATES, 1906—*continued.*

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NEWCASTLE—*continued.*																							
Miller, Ed., *Yorkshire*	...	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Monkman, Percy L., *Yorkshire* ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	H	P	P	P	...	...
Penney, Herbert G., *Royal Exchange*	P	...	...	...	...	...	...	...	H	P	...	H	...	...	P	P	...	...	...	...	...	...	...
Smith, Alfred, *Hand-in-Hand* ...	P	...	P	P	...	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Tyson, Stanley, *Liverpool and London and Globe*	P	P	P	H	...	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Waite, Reginald Kirby, *Royal* ...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
White, Clement, *British Law* ...	...	...	...	...	...	C	C	1906	...	...	...	...	...	P	P	P	...	...	...	..	...	...	...
Wood, Chas. Surtees, *Norwich Union*	...	...	P	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Woodward, John S., *North British and Mercantile*	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

NOTTINGHAM.																							
Mallett, Robt. Wm., *Northern* ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	...	...	...	...	...	...	...	..
Radmale, Fredk. Hy., *Guardian*	P	...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
PERTH.																							
Brown, John Milne, *General Accident*	...	...	P	...	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Campbell, Kenneth, *General Accident*	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	P	1906	...	...	...	P	...	...
Clarke, Harry, *General Accident*	P	...	H	P	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Henderson, W. R., *General Accident*	...	...	...	...	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hutchison, Jno., *General Accident*	...	...	H	...	C	C	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...
Stirling, Wm., *General Accident*	...	...	P	...	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
SHEFFIELD.																							
Clarke, Kenneth R., *Alliance* ...	...	...	P	...	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...
Fryer, Lawrence H., *Alliance* ...	...	...	...	...	C	C	C	1906	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Jones, Claude L., *Alliance* ...	P	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...
Moorhouse, J. D., *Alliance* ...	...	...	...	...	...	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Phillips, Harold, *Alliance* ...	...	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

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Sheffield—*continued.*																							
Phillips, Wm. Hy., *Alliance* ...	...	...	...	...	C	C	C	1906	H	H	H	P	H	...	P	H	...	...	...	...	...	...	...
Pughe, Lewis E., *Alliance* ...	...	...	...	...	...	...	...	...	...	P	...	...	...	...	...	P	...	...	...	...	...	...	...
Rowntree, Herbert, *Yorkshire* ...	...	...	P	P	...	C	C	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Unwin, Edwin Booth, *Alliance* ...	P	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wortley, Harry, *Alliance* ...	P	...	H	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
York.																							
Hopkins, Ronald, *Yorkshire* ...	P	...	...	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Noble, Bertram F., *Yorkshire* ...	P	P	...	H	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

ACCIDENT BRANCH.

	Part I.					Part II.					Part III.			
	Correspondence.	Book-keeping.	Classification.	Knowledge of Employers' Liability.	Passed in Part I.	Claims.	Policy Drafting.	Indemnity Insurance.	Medical and Surgical Terms.	Passed in Part II.	Law.	Law relating to Accident Insurance.	Continental Law.	Passed in Part III.
Aberdeen.														
Campbell, W. T., *London and Lancashire*	...	C	P	H	...	...	...	...	...	...	...	...	...	...
Bedford.														
Spiller, Thos. W., *National Union* ...	...	C	H	P	1906	...	...	...	...	...	...	...	...	...
Belfast.														
Macfarlane, Joseph Y., *Commercial Union*	...	...	P	P	...	...	...	...	...	...	...	...	...	...
Birmingham.														
Burrow, George, *Norwich and London* ...	P	...	P	P	...	...	...	...	...	...	...	...	...	...
Marshall, George F., *Commercial Union*	H	...	P	P	...	...	...	...	...	...	...	...	...	...

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Cardiff.														
Gunn, Frank, *General Accident*	...	...	...	P	...	...	...	...	...	...	...	...	...	...
Harbidge, Reynold V., *General Accident*	...	...	...	P	...	.	...	...	...	...	...	...	...	...
Shenton, Joseph, *Ocean*	...	...	P	P	...	...	...	...	...	...	...	...	...	...
Woolway, C. John, *Lancashire and Yorkshire*	...	...	P	...	...	...	...	...	...	...	...	...	...	...
Wride, Harold M., *Ocean*	...	...	P	...	...	...	...	...	...	...	...	...	...	...
Dublin.														
Johnston, I. Irwin, *Yorkshire*	...	...	...	P	...	...	...	...	...	...	...	...	...	...
Robinson, Thos. M., *London and Lancashire*	...	...	P	H	...	...	...	...	...	...	...	...	...	...
Dundee.														
Maitland, Andrew, *General Accident* ...	P	...	...	P	...	...	...	...	...	..	...	...	...	...

EDINBURGH.														
Black, Robert, *Ocean*	...	...	...	...	...	...	...	...	...	...	P	...	P	...
Campbell, John, *Life and Health* ...	...	...	P	P	...	...	...	...	...	...	...	...	...	...
Coutts, Geo. K., *Century*	...	...	P	...	...	...	...	...	...	...	..	...	...	...
Lammie, George, *Accident*	...	...	P	P	...	...	...	...	...	...	...	...	...	...
Robertson, Thomas, *Accident*	...	...	...	H	1906	...	P	P	...	...	...	...	...	...
Ross, Bertie M., *Life and Health* ...	...	...	P	...	...	...	...	...	...	...	...	...	...	...
Wilson, Daniel M., *Life and Health* ...	...	...	P	P	...	...	...	...	...	...	...	...	...	...
PETERBORO'.														
Hill, Geoffrey T., *Yorkshire*	...	...	...	P	...	...	...	...	...	...	...	...	...	...
YORK.														
Shaw, Herbert, *Yorkshire*	...	...	P	P	...	...	...	...	...	...	...	...	...	...
LEEDS.														
Coltman, Arthur, *Employers' Liability* ...	...	...	...	...	...	...	...	...	...	...	P	...	P	1906
Hainsworth, George, *Hand-in-Hand* ...	...	...	P	P	...	...	...	...	...	...	...	...	...	...
Jolliffe, E. H., *London and Lancashire* ...	...	..	...	P	1906	P	P	P	P	1906	...	...	..	...
Metcalfe, Percy W., *Ocean*	...	C	P	P	...	...	...	...	...	...	...	...	...	...
Roulstone, H., *Law Accident*	...	...	H	P	...	...	...	...	...	...	...	...	...	...

NAMES OF SUCCESSFUL CANDIDATES, 1906—*continued.*

	Part I.					Part II.					Part III.			
	Correspondence.	Book-keeping.	Classification.	Knowledge of Employers' Liability.	Passed in Part I.	Claims.	Policy Drafting.	Indemnity Insurance.	Medical and Surgical Terms.	Passed in Part II.	Law.	Law relating to Accident Insurance.	Continental Law.	Passed in Part III.
Liverpool.														
Muir, Allan, *Guardian*	...	...	...	P	1906	P	P	P	P	1906	...	...	...	...
Brown, Thos. G., *Guardian*	...	...	P	P	...	...	...	...	...	...	...	...	...	...
London.														
Horne, A. J., *Central*	...	...	P	P	...	...	...	...	...	...	...	...	...	...
Williams, Harry V., *Ocean*	...	...	P	P	...	...	...	...	...	...	...	...	...	...
Winser, Fred G., *Guardian*	...	...	P	...	...	...	...	...	...	...	...	...	...	...
Manchester.														
Izon, George, *Norwich and London* ...	...	...	...	P	...	...	...	...	...	...	...	...	...	...
Sutcliffe, E. H., *General Accident* ...	...	...	P	P	...	...	...	...	...	...	...	...	...	...
Wilde, Charles, *Ocean*	...	...	...	...	...	...	P	P	P	...	...	...	...	...

Newcastle-on-Tyne.														
Jackson, Wm., *Ocean*	...	C	...	...	1906	...	P	P	...	1906	...	...	...	...
Stobbs, James, *London and Lancashire* ...	...	...	...	...	...	...	...	...	...	...	P	...	...	...
Scott, G. Ernest, *Ocean*	...	C	...	...	1906	...	...	...	...	1906	...	...	...	...
Perth.														
Dewar, David M., *General Accident* ...	...	...	P	H	...	...	...	...	...	...	...	...	...	...
Forbes, Ed. John, *General Accident* ...	...	C	...	P	...	...	...	...	...	...	...	...	...	...
Galloway, John R., *General Accident* ...	...	C	P	P	...	...	...	...	...	...	...	...	...	...
Hutcheon, F. Wm., *General Accident* ..	...	C	P	P	...	...	...	...	...	...	...	...	...	...
McIntosh, Peter H., *General Accident* ...	...	...	P	P	...	...	...	...	...	...	...	...	...	...
Paton, Wm., *General Accident*	...	...	...	P	...	...	...	...	...	...	...	...	...	...
Smith, Thos., *General Accident*	H	...	H	P	...	...	...	...	...	...	...	...	...	...
Taylor, Ed. Natuna, *General Accident* ...	...	C	...	...	1906	P	P	P	H	1906	...	...	...	...

NAMES OF SUCCESSFUL CANDIDATES, 1906—*continued.*

LIFE BRANCH.

	Part I.				Part II.		
	Mathematics.	Proposals, Medical, etc., Conditions.	Book-keeping.	Passed in Part I.	Law Loans, Correspondence.	Bonus System.	Passed in Part II.
Birmingham.							
Rushton, T. Arthur, *Prudential*	...	...	...	...	P	H	1906
Cambridge.							
Carr, Norman, *Prudential*	...	P	...	...	...	...	...
Dublin.							
May, F. W. L., *Scottish Widows*	C	P	...	...	...	...	...
Meredith, Llewellyn, *City of Glasgow* ...	...	P	...	...	...	..	...
Verdon, John W., *Yorkshire*	...	P	...	...	..	..	.

EDINBURGH.							
Forsyth, Alexander W., *Scottish Widows* ...	C	...	C	...	...	...	...
LEEDS.							
Hall, Anthony S., *Scottish Widows*	...	P	...	...	...	...	...
LIVERPOOL.							
Plowright, Sydney G. F., *Liverpool and London and Globe*	C	H	...	...	...	..	...
MANCHESTER.							
Swindells, F. E., *Scottish Amicable* ...	C	...	C	1906	P	H	1906

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ACCIDENT.

FINANCIAL AND GENERAL.

FIRE.

LIFE.